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RAILROAD GAZETTE

A JOURNAL OF TRANSPORTATION, ENGINEERING AND RAILROAD NEWS

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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

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On one of the railroads where tests of the conduct of enginemen in observing signals are constantly being made, the number of tests recorded in the last six months was 1,417, of which 1,413 showed compliance with the rules. Of the other four cases one was that of the engineman of a freight train who ran past an automatic signal indicating stop, and the other three were failures of freight enginemen to make a full stop on running over one torpedo. In all of the four cases the enginemen reduced speed. What punishment, if any, was inflicted, is not reported. For disregarding an automatic signal indicating "stop" some roads, we are informed, make the penalty dismissal, without a hearing—almost. That is to say, the instances where an excuse is accepted are so rare that they may be counted as nil. In this connection, the scarcity of men in all departments of train work at the present time raises an interesting query. When a man, otherwise efficient, is discharged for an offense like this, how soon will it be fair to re-employ him? The mere fact that, after being discharged, he has to come on as a new man is in itself a severe punishment, even if he were to lose no time; and if he is likely to heed the lesson of his mistake, is he not an engineman worth having? It would be of interest to know the attitude of "book discipline" enthusiasts on this question. Another question: Should a man thus discharged and taken back be allowed to continue his relief department benefits, as though his employment had been continuous? Many a superintendent has, no doubt, screwed up his courage to discharge a man, partly by the argument that—thanks to the ease with which employment could be found on another road—the man would not be deprived of a livelihood. But where a "Relief Feature" ties him to a single road this argument loses some of its force. The disregard of the torpedoes raises the question whether it is worth while to maintain two torpedo indications. Why not make the explosion of any number of detonators a signal to at once bring the speed of the train under control? Is not this sufficient for all kinds of obstructions, except those which are invisible? And if an obstruction is invisible—as, for instance, a weak spot in the ballast—does any one ever think of depending on a torpedo to protect trains against it? It is proper to enforce rules, whether they are reasonable or not. For that we have the authority of the United States Supreme Court in the Trans-Missouri Traffic Association. But it is usually the part of wisdom to first make the rules reasonable. With only one torpedo indication, and that not requiring a full stop at a defined point, the detection of negligence or of slipshod compliance with the rule would not be quite so easy as it is to show that, in a given instance, no stop was made. But if the stop (as now required, for one torpedo) is usually unnecessary the energy spent in enforcing it might better be employed in enforcing the under-control rule.

THE NEW YORK CITY EAST RIVER BRIDGES.

During the past two years there has stood in the city of New York a monument of engineering skill and likewise a monumental instance of municipal incapacity. The Williamsburg bridge over East river was completed in December, 1903, and with appropriate ceremonies was delivered to the city and "accepted" by its Mayor. Since then this structure, costing $11,400,000, has been somewhat a convenience to Long Island truck farmers and a few passengers, but no connections have been made, either on the Brooklyn or Manhattan side with the subway or elevated rapid transit systems. When a few weeks ago a vignetted engraving of this noble structure, with both ends fading into nothingness, was shown to the President of the Brooklyn Rapid Transit Company, he exclaimed: "That is the most accurate drawing of our bridge terminals that I have ever seen."

During this two years of disuse, the already congested traffic on the original Brooklyn bridge has been increasing in density. For several hours a day the crush of men, women and young persons at the terminals has been disgusting, for no woman should be so exposed to crowding; and dangerous, for there have been deaths and injuries. The relief intended by the building of the second bridge has not been given because of the incapacity of city officers and the opposition of "civic oodies" to each of the plans proposed—any of which would have immediately relieved and disposed of a shameful condition.

The use of an East river bridge is of two kinds: 1. For teams and persons who cross the river and need no further facilities. 2. As a section of railroad track to be included in the rapid transit system. It happens that each of these two uses accommodates about an equal number of persons. Soon after the Williamsburg bridge

was completed, Mr. Winter, President of the Brooklyn Rapid Transit Company, submitted a plan and a fair money proposition for making the bridge useful, by extending his Brooklyn elevated system to a connection with the new bridge, in such a way as to make a loop in Brooklyn connecting with many stations on its rapid transit lines. For the borough of New York, he proposed a widening of some streets in the slums of the city and an elevated railroad loop from the City Hall terminal to the Williamsburg bridge terminal, distributing passengers at many stations where they could transfer to the city lines—an ideal system of distribution and relief from congestion at the terminals. It met with the usual opposition: The Municipal Art Society—fine arts, not the useful arts—who believed that Baxter street and Delancey street should not be widened and defaced by a transportation system. There were other organizations, called "civic bodies," in opposition. Any active man, with an axe to grind, can make such a paper organization. The Board of Estimate and Apportionment made the mistake of reading public sentiment in these protests, and rejected the plan. Is not this city subway-mad?

A few weeks ago the Bridge Department engineers submitted to the Board of Estimate plans for terminals for the third bridge —named Manhattan Bridge—now in course of construction. These structures are necessary, for about one-half the passengers assemble at the terminals. Mr. Nichols, the chief engineer, had done his work well. The plans were modest in cost, almost uncriticisable in design, and adapted to the needs. At the hearing, the same old civic bodies appeared and opposed. In addition to the art society there was the "Prospect Heights Citizens' Association," the "Transit Reform League," the "Allied Board of Trade," a "Taxpayers' Association," and others. It is only a slight exaggeration to say that the trend of opinion seemed to be that the city should continue to build bridges and hold them useless until the wicked investors in city railways were ready to carry passengers in cars run through from Coney Island to Harlem for one fare. And so the Board returned the terminal plans to the Bridge Department "for reconsideration."

The problem to be solved is not at all a simple one, nevertheless there are now well known enough governing conditions to make further interference by amateur organizations quite unnecessary. The capable engineers we already have, who have for years studied the subject, can soon solve it satisfactorily if they have the chance. It is plain that any system of through cars is impracticable, because this would congest the already busy lines in Brooklyn and New York, and also because combustible cars are especially dangerous in a subway. It is plain that terminal stations are needed at each bridge end. It is also plain that loop lines, in each borough, reaching only far enough to distribute passengers to surface lines and quite near to stations on the elevated and subway is the only rational way of lessening the crowd at the bridge ends. These loops may be either elevated structures or subways or both, depending on the location. Mr. Nichols outlines an excellent plan, and is undoubtedly ready to present it in detail whenever the Board of Estimate call for it. Mr. Winter's proposition was designed for economy in first cost and for safe operation. His plan for street widening and an elevated structure through the poorer part of the city was distinctly for the benefit of that region as well as for the convenience of passengers. It is unsafe to have a sharp grade down to a subway station at the New York end of the Brooklyn bridge. Still, so long as the present indiscriminate subway madness continues, that plan may wait; and possibly the new Bridge Commissioner may encourage his engineers to usurp some of the functions of the Rapid Transit Commission and solve the problem.

RAILROAD BONDS IN THE SAVINGS BANKS.

During the four years from 1900 to 1904 the capital stock per mile outstanding of American railroad companies remained almost stationary and increased only from $30,205 per mile to $30,686 per mile. During the same four years the outstanding bonds of the same corporations increased from $29,967 per mile to $35,418 per mile, or about 18 per cent. This is conclusive proof of an existing "bond period" in railroad financing. In connection with it the matter of the various absorbents of railroad bonds, new and old, is an interesting and fruitful study. Of its many branches, some of them vague and speculative, others visible and determinate, none is more suggestive than the increase of savings bank investment in railroad bonds. It would be instructive, if for no other reason, as showing and measuring the attitude of an immense group of conservative investing institutions toward railroad securities; and a secondary and derived matter of importance is the effect of that attitude on financial methods and policies of the railroad corporations themselves.

As an illustration of the drift of savings bank investment toward railorad bonds let us take the latest returns during two years from New York state and from the three larger states of New England. In 1902 the total resources of the savings banks of the State of New York were $1,191,330,573, of which $151,991,779 was invested in railroad bonds. Corresponding figures for 1903 were $1,238,800,468 and $177,444,223; and for 1904 they were $1,311,993,505 and $196,982,385. Using approximate figures, while the total resources of the New York savings banks increased during the two years $120,662,932, or about 10 per cent., the railroad bond holdings increased $44,990,606, or almost 30 per cent. Massachusetts savings banks had in 1902 resources of $627,959,337 and $93,943,176 in railroad bonds; in 1903 they had $649,437,662 resources and $102,214,285 in railroad bonds; and in 1904 they had $674,644,990 resources and $113,510,243 in railroad bonds. During the two years resources increased somewhat more than 7 per cent., while railroad bond investments increased more than 21 per cent., and, if we were to add street railway bonds, more than 27 per cent. The $82,741,563 savings bank resources of Maine in 1904 and their $35,123,560 of railroad bond investments show an increase for the two years of about 6 per cent. and about 21 per cent. respectively. Corresponding figures for Connecticut are $233,055,954 resources, $82,265,024 railroad bonds, and increases for the two years of about 9 per cent. and somewhat more than 18 per cent. respectively—the latter percentage likely to be increased considerably, now that large groups of street railway bonds in the state have been opened to savings bank purchase by recent legislation.

Taking New York state and the three leading New England states together the showing for 1902 is $2,112,046,622, and for 1904 it is $2,302,436,014, or an increase of resources of about 9 per cent. in two years, while railroad bond investments for the same period grow from $344,337,720 to $427,881,212, or about 24 per cent.—railroad bonds held thus increasing more than two and a half times as rapidly as resources. The last computations give comparisons on a great scale and include probably about two-thirds of all the savings bank assets of the United States which may be estimated roughly at about $3,400,000,000. It should be said, by way of mild qualification, that some of the states return railroad stocks and bonds together; but the amount of stocks held is so relatively small that it may be ignored. The total of outstanding railroad bonds in the whole country is returned as $6,932,996,651. Allowing for private savings banks in the West and South, returns from which are very defective, the total amount of railroad bonds held by American savings banks is probably about $600,000,000, or say 9 per cent. of all bonds outstanding. But the influence of the savings banks as absorbents of railroad bonds goes much further. In some states—Connecticut for example—the same law of investment applies to individual trustees as to the savings banks. How far such laws tend to further absorption of railroad bonds can only be guessed at, but it must be a very potential "digestive" force.

As we depart from the actual figures showing how swiftly railroad bonds are passing to the savings banks the subject broadens outward in several radiants. Thus the investment returns on municipal bonds and on realty mortgages has, on the whole, during the last few years fallen lower proportionately than on first class railroad bonds. The relative annual return may be perhaps fixed as about 3.50 per cent. on municipal bonds of high degree and 3.70 per cent. on railroad bonds of the same general grade. This undoubtedly has shifted savings bank money from municipal into railroad securities. But a more important factor is the extension of state law-making so as to include railroad bonds formerly excluded—this largely as a result of higher railroad credit and such fiscal operations as the refunding of old issues—usually first mortgages—into "consolidated" mortgage bonds issued on a pretty big scale. Naturally this has resulted in lobby work to induce legislatures to admit new issues to the "legal" savings bank lists; and therein lies a very appreciable danger of which state lawmakers should beware. Another trend, worth its passing attention, is the tendency of legislatures more and more to open the securities of roads within the state—a good tendency inasmuch as it may tend to investment in railroad bonds that are more immediately under the savings bank manager's eye, but somewhat perilous in that local favoritism may be pushed too far.

Another branch of this "localization" and of the amplified subject is the legalizing of street railway bonds for savings bank

purchase, now that the street railway has become in so many cases a property outside of speculative investment and venture. Thus during the first year—apparently 1903—when street railway bonds were opened, under certain restrictions, to the Massachusetts savings banks $3,769,594 were taken in that class of security and in 1904 the amount had risen to $6,324,370, an increase of about 70 per cent. In 1904 some thirty electric railway companies of the state had been approved by the Massachusetts savings bank commissioners and their bonds placed on the "admitted" list. Maine admits the bonds of any street railway in the state and first mortgage bonds of street railways in certain other states, and New Hampshire, with restrictions, follows the same rule. Other eastern states, under more general statutes of investment, are even more liberal. Vermont appears to be unique and isolated in excluding both railroad and railway bonds of all kinds. In Connecticut, which adopts in the matter of street railway bonds the "local" idea, is presented the anomaly of savings bank legalization of certain junior street railway bonds while certain underlying senior bonds of constituent railway corporations have been left under the ban—a fiscal paradox showing strikingly the deft hand of the lobbyist.

In summarizing results and tendencies, along with some perils, the steady drift of railroad bonds to the savings banks and trustees, must be accounted a decided moral gain. Apart from its evidence of the higher average value of the American railroad bond, in railroad financing it nods clearly toward conservative bonding. The average railroad corporation will tend more and more toward sane and safe issues of bonds as it comes to realize how important are the savings banks as a bond market; and, *per contra*, there is not much danger that a savings bank will be misled by more liberal statute-making in its judgment of intrinsic and bed-rock values of the bonds which protect the hard-won dollars of the poor. But, quite aside from such considerations, the bond drift to the savings banks is of moment as indexing a new and expanded relation of railroad policy and properties to perhaps the most conservative element of finance—and as vast as it is conservative.

A REVIEW OF THE RAILROAD YEAR.

It is often exceedingly difficult for persons directly and closely connected with great enterprises and with historical movements to get a comprehensive view of them. Their own tasks are highly specialized, and they are so much concerned in the day's work that the events which come under their constant notice are apt to take the form of isolated parts rather than as elements in a comprehensive whole. For that reason it is well to view the remarkable year of 1905—remarkable for many reasons, industrial, commercial and political—from a standpoint a little more remote than is possible in the current record maintained by this journal.

Speaking broadly, the event which stood out most prominently in the previous year, 1904, as possessing permanent historical interest, was the Northern Securities decision, the effect of which was a good deal smaller than was thought at the time in its direct relations to the properties concerned, but was extremely broad and important as an expression of the attitude of the Government towards evasion of the law regarding the operation of parallel lines through the medium of a holding company. Had the Northern Securities Company been sustained, there were groups of carriers all over the country ready to follow its precedent; but in the face of the decision the community of interest method at once gave way again to the competitive method of railroad operation and development. It is fair to say, in view of recent developments, that it would probably have done so anyway, but the decision of the Supreme Court gave the movement a definite date.

The development of competitive building, with particular reference to Pacific Coast extensions, has been one of the great epochs of the year 1905. From a historical point of view, however, it is doubtless secondary in importance to the era of corporate house-cleaning inaugurated by President Roosevelt. Throughout the year, without interruption, great corporations have come into the light of publicity one after the other, to explain obscure passages in their history. On February 9 the House of Representatives passed the Esch-Townsend bill creating a court of transportation and providing that a new rate proposed by the Interstate Commerce Commission, after an old rate had been declared unreasonable, should become operative in thirty days, subject to review by this court of transportation sitting as a court of equity. The bill was crude, it was not feasible, it was presumably unconstitutional, and it was inadequate to remedy the real evils which existed. Hence the Senate refused to be stampeded into passing it. But the flood of literature which it brought forward on both sides of the subject has cleared the air, and in place of the general feeling of dissatisfaction with the railroads—the feeling that something was wrong and that the remedy presumably lay in giving an outside body power to fix the vast and complicated schedule of railroad rates throughout the country—it is now clearly understood that unfair preference and discrimination, and not rates in themselves, constitute the evil, and Congress has taken upon itself the task of remedying this state of affairs and will probably not be drawn into the widely accepted fallacies of the early part of the discussion.

In brief, 1905 is remarkable as the year in which the American people have learned infinitely more about their railroads than they ever knew before—a knowledge which seems quite certain to allay the unmistakable hostility towards the railroad corporations that was coming to look like a dangerous element in the national politics.

Turning from this historical feature of the year's progress to the more definite and technical one of the tendency of railroad construction, it will be recollected that three great companies are now definitely committed to extending their lines to the coast. The Grand Trunk Pacific did not date its beginnings from 1905, but actual grading work really belongs to the chronicle of the year, together with the grants of money from the Canadian Government. Contract was let in September to build from Portage la Prairie, near Winnipeg, Manitoba, 275 miles west to Touchwood Hills, Northwest Territories. Some uncertainty still exists with regard to the eastern terminus of this line, but west of the St. Lawrence river it seems reasonably certain that it will extend from Quebec through Winnipeg to Port Simpson, British Columbia, with an extension proposed to Dawson, in the Klondike. During 1905, also, Gould's line, the Western Pacific, was financed by the original sale of $50,000,000 of bonds underwritten at 90, and work has been definitely begun on the road between Salt Lake City and Oakland, approximately 800 miles. The Western Pacific is the new low grade connection from the coast to the junction with the Rio Grande Western at Salt Lake City, the Missouri Pacific reaching the Denver & Rio Grande at Pueblo, Colorado.

In the record of 1905, also, belongs the announced decision of the St. Paul to build to the coast. In our issue of December 15 we called attention to the fact that this system had been in its essence a strong and compact local railroad, and as a suggestion of the number of short and originally independent railroads which it now includes, we spoke of the five companies whose names began with Dubuque, of the nine whose names began with Chicago, and of the 16 which had Milwaukee as their real or alleged starting point, all of which are among the component parts of the present Chicago, Milwaukee & St. Paul. In spite of its splendid local territory northwest of Chicago, reaching as far north as Fargo, N. D., and as far west as Evarts and Chamberlain on the Missouri river in South Dakota, with three other north and south branches from the South Dakota line into North Dakota and multitudinous connections and short branch lines, the St. Paul lacks and realizes its need for the future of the profits which come from a through line and a through line business. We pointed out in the same issue that with a mileage of nearly 7,000 miles the St. Paul carried its typical ton of freight in 1904 only 185 miles, while on the Union Pacific the average haul is 386 miles. From Evarts, the starting point of the St. Paul's new line, to Seattle and Tacoma, its proposed coast terminals, the air line distance is about 1,040 miles, and the actual length of the line to be built will probably be not far from 1,500 miles.

The advance in electrification of steam railroads figured as an important event in 1905, and is sure to figure still more importantly in the next few years. The New York Central made satisfactory tests of its first electric locomotive last May, and has work well in hand on the electrification of its New York suburban zone, which is to be worked by direct-current trains operated under the multiple unit system of control. The determination of the New Haven road to work its trains in and out of the New York terminal by alternating current has been fully discussed in these columns and nothing more need be said at the present time. During the year part of the Long Island suburban electrification in the vicinity of Long Island City was also put in commission, and announcement is now made that the Pennsylvania proposes at once to electrify its Atlantic City connection over the West Jersey & Seashore, on the direct-current system. The old London underground railways, formerly almost intolerable because of smoke and gas, also began working by electricity during the year. The Lancashire & York-

shire, North Eastern and Mersey lines date back to 1904. In this country both the Lackawanna and the Erie are currently supposed to be watching the situation very closely with a view to electrifying part of their New York lines as soon as it seems expedient to do so. The expense of electrification is very great. Its advantages also are very great in congested short-haul passenger territory, and by the respective weighing of cost and advantage it is fair to suppose that each succeeding year will bring out its new crop of ventures, gradually extending from the most congested to the less congested portions of the lines. The obvious field at present is in the vicinity of great cities—New York, Chicago and Philadelphia, and, to a lesser degree, St. Louis and Boston.

Turning again to the broad as against the specific aspects of the railroad year, 1905 stands at the top record of profitableness for the railroads, not only on account of the large gains in gross earnings occasioned by big crops and great general prosperity, but also because the alarming increases in operating expenses, and particularly in the item of conducting transportation, which were characteristic of 1903 and, to a certain degree, of 1904, have been checked in a highly satisfactory manner. For some years fuel cost has been rising dangerously fast. This year it was down again, while the attention which began to be paid to other items in the expense account in 1903 has apparently continued unabated. Without retrenchment, but with care and skill in operation, the increases in the year's net earnings are even more impressive than the increases in gross. This particular branch of the subject cannot be fully treated in a brief abstract of this character. It will be taken up at length and illustrated by diagrams in a subsequent issue.

As would naturally have been expected, in view of the great traffic increases, there was a car shortage in the fall, although equipment bought during the year considerably exceeded all previous records, with a total of 165,455 freight cars, 2,551 passenger cars and 5,491 locomotives. Current orders with the equipment companies have been extremely heavy, one trunk line having placed orders for some five times as many cars as it requires in an ordinary season. It is rather a prospective feature of 1906 than of 1905, although it should be mentioned in this connection that a large number of the cars now on the books could be sold at a considerable profit by the companies which have ordered them if they so cared to sell them, since the capacity of the works for 1906 is about taken up.

The year has been notable for its sales of bonds, which for the second time in the history of the country have exceeded $1,000,000,000, and are reported by conservative financial journals to aggregate about $1,130,000,000, including time extensions, temporary obligations, etc. There has been a fortunate and noteworthy absence of financing of the 1901 order, except in a very few instances. The Cincinnati, Hamilton & Dayton financing was sufficiently bad and is sufficiently fresh in the mind of the reader, so it needs no comment. The new financing of the Belmont syndicate with which it is proposed to consolidate the New York City street railway and the Interborough elevated and subway lines also looks pretty bad, in that the vast sum of common stock to be created, underwritten at 60 per cent., stands for nothing more than capitalization of the future.

Without including a record of street railway progress, except so far as affects steam roads, it must nevertheless be observed that the New Haven road has been largely increasing its holdings in these companies during the year, and as far back as last spring owned something like 60 per cent. of the entire single-track trolley mileage of the State of Connecticut. The recent purchase of the Albany United Traction by the Delaware & Hudson is also noteworthy. As a transaction it seems to point to a general future plan of safeguarding the steam company's interest rather than of any important uses or developments, since the United Traction has no long interurban lines, but furnishes simply the key to the suburban situation in Delaware & Hudson Albany territory by the trackage privilege it grants the Albany & Hudson, Hudson Valley, Schenectady Railway, and the other interurban lines in the district. The first alternating current line of any importance in this country was also opened during 1905—the Indianapolis & Rushville section of the Indianapolis & Cincinnati Traction Company—approximately 50 miles long. Without pausing to go into the subject at length, it may be pointed out that the use of alternating current, with its economies in construction and operation, its avoidance of electrolysis, and other advantages, seems likely to modify in an important degree the relation of steam and electric roads in the near future.

In England, 1905 has been for one thing notable as the year in which the rage for rail motor cars has received a setback. In 1904 the Great Western was turning out steam motor cars as fast as its Swindon works could make them. It now is beginning to doubt their economy, just at the time that continuous experiments are being made, for the first time, in this country. The Union Pacific has put two gasolene motors in service this year; the Alton has built a gasolene-electric car; the Rock Island motive power department has brought out an elaborate report on the subject. But it seems safe to say that we are still some distance from the motor car period of branch line development, if there ever is to be such a period—and it looks further away now than it did last year at this time.

Among the many interesting events during the year which can only be touched on may be mentioned the determination of Mr. Flagler to extend the Florida East Coast Line from Miami to Key West, 126 miles over the Florida Keys; an enterprise as unique as the Central Pacific extension across the waters of Salt Lake, recorded last year. On April 2 the Simplon tunnel connecting Switzerland and Italy was opened for a construction train amid impressive ceremonies. The Chicago freight tunnels, built without the people of the city of Chicago knowing anything about them, were also opened for service during the year. In the spring the Great Northern's two gigantic steamships "Minnesota" and "Dakota" began service to the Orient. Mr. Hill has not hesitated to say that they were highly extravagant to build and are an unsatisfactory investment.

A record of the year will, of course, be incomplete without reference to the International Railway Congress at Washington last May, which brought a great number of highly trained railroad men from all parts of the world and certainly broadened their interests, even though it may not have added much to the specific usefulness of the majority of the delegates present.

Three other unclassified events which belong in the chronicle are the running of 18-hour trains from New York to Chicago on the New York Central and the Pennsylvania and the breaking of speed records by these and other trains; the new organization of the Isthmian Canal Board with the subsequent resignation of Mr. Wallace and the appointment of John F. Stevens as Chief Engineer, and the letting of contracts and actual progress of work on our own New York State barge canal.

The New England Roads.

In the *Railroad Gazette* of Oct. 6 the annual report of the Boston & Maine was reviewed, and occasion was taken to touch briefly on the comparison between that property and the New York, New Haven & Hartford. It is of interest to carry this somewhat farther.

Roughly speaking, the entire railroad traffic of the New England states is in the hands of these two companies, the territory shared dividing naturally at Boston. The New Haven road operates 2,088 miles of main line; the Boston & Maine 2,288, so that the division is very nearly an equal one. Another interesting parallel between the two is the recent establishment of western connections; the New Haven road through the Ontario & Western, the Boston & Maine through the Fitchburg. It is still too soon for any important results to be shown from the Ontario & Western purchase, since much reconstruction of the New Haven connecting lines has been necessary to develop the possibilities of usefulness of the addition. The Boston & Maine, however, has had the Fitchburg since 1901, and it has proved a very valuable investment. The gross earnings of the Boston & Maine for 1901 after its lease of the Fitchburg, were $31,375,620. In 1905 they were $36,800,834, an increase of $5,425,214; while in that same time the increase in the Boston & Maine's fixed charges, including sinking fund, taxes, interest on debt, and rental of leased roads, increased only $131,100. Add to this the amount necessary to continue dividends at the usual rate, an increase of $161,646, the entire amount required to provide for the road's annual dividend disbursements and fixed charge obligations only increased $292,746 in the four years, as compared with the handsome increase in gross earnings shown; the comparison being that the gross income increased over 17 per cent. while its fixed charge and dividend obligations increased less than 3 per cent.

It is characteristic of both the New Haven road and the Boston & Maine that a comparatively small surplus from the year's operation is habitually carried forward. These roads, unlike the western lines, do not have to equip themselves for the startlingly rapid changes in the growth and development of the country. They occupy the oldest and most thickly settled portion of the United States, and their problem of betterment appropriations does not normally extend much beyond full maintenance. Of course, at the

present time the New Haven road is behind in its maintenance and is spending large sums to catch up, in rebuilding its bridges, improving its connections to the Ontario & Western and doing work that had been neglected for several years. Some of this work is logically charged against operating expenses; much of it is logically charged against capital. The Boston & Maine has no such problem at present and is not likely to have in the near future. Hence the fact that its total surplus carried forward is much smaller than the New Haven road's total surplus is not especially significant. On June 30, 1905, the New Haven road carried a balance of $15,118,598 forward to next year's account. The Boston & Maine carried forward $2,494,141. On the New Haven road annual dividends absorbed 95 per cent. of the balance of net income applicable; on the Boston & Maine they absorbed precisely the same proportion.

Gross earnings from operation of the Boston & Maine for the year ending June 30, 1905, were $36,213,245; operating expenses, including a charge of $807,782 for new equipment, were $26,619,740, leaving net earnings from operation $9,593,505; gross income $10,181,094, and net income, after deduction of charges and sinking fund payments, $1,883,572. Gross earnings from freight were somewhere near double those from passenger traffic, and this is peculiarly significant in connection with the Fitchburg lease. Gross earnings from operation on the New Haven road in the same period were $49,981,948; operating expenses were $35,833,023; net earnings from operation were $14,148,925; gross income was $15,372,377, and net income $6,708,052. Until quite recent years, passenger earnings used habitually to exceed freight earnings on this road, but at present freight earnings are slightly in excess and bid fair to become even greater proportionately when the lines are put in shape to handle the traffic that is coming to them. In view of the relative population served by the lines, it is, of course, natural that gross earnings per mile of road should be larger on the New Haven system than on the Boston & Maine, amounting respectively to $23,937 and to $15,826, both of these figures serving to illustrate the surprising traffic density of the country traversed.

Prior to the Fitchburg lease of the Boston & Maine the respective proportion of the gross earnings from freight and from passengers was not so very different from that now existing on the New Haven road. In 1898 freight earnings constituted about 52 per cent. of gross, in 1899 practically the same, in 1900 54 per cent., in 1901, including the first full year's operation of the Fitchburg, nearly 59 per cent., and in 1905 just over 60 per cent. On the New Haven road freight earnings now amount to a little less than 51 per cent. of the total.

This study in comparison naturally leads to the suggestion that with its passenger traffic by no means fully developed, but far more fully developed than the freight traffic, the New Haven road, through its new western connection, may be able within the next few years to increase largely its freight traffic over the least congested portion of its system, and bring all of its lines up to a standard of usefulness and traffic density approaching that of the coast lines.

Last week there met in New York City educators representing 58 American colleges, called together to abate the perils of operation, of the head-on collisions and of the gory wreckage of the game of football. In the penumbra of so august a gathering and with football dividing time—albeit somewhat unequally—at the White House with the rate question, we offer no excuse for throwing fresh light on the fiscal proportions of the sport in railroad traffic. A year or so ago, for the first time in the records of transportation, we were able to give the traffic returns of the New Haven road for the "big" Yale-Harvard game at New Haven. This year we can expand the figures over six years and the same number of "big" games, as will be seen in the table annexed:

Year.		No. one-way passengers.	Receipts.
1905.	Yale-Princeton game	30,529	$40,472
1904.	Yale-Harvard game	32,529	53,666
1903.	Yale-Princeton game	32,431	40,826
1902.	Yale-Harvard game	39,349	60,567
1901.	Yale-Princeton game	19,993	22,234
1900.	Yale-Harvard game	24,684	38,879
	Total	179,515	$256,644

More than a quarter million dollars of gross receipts from six annual football games is an item of revenue which the greatest railroad corporation could hardly deem contemptible. And there are some incidental comparisons: They, the New Haven Company, during last year took in from regular and commutation passenger business $20,008,579 gross, or about $54,800 a day. It will be seen from the table that a single game in 1904 very nearly equalled in passenger receipts the daily passenger business on the whole system of 4,245 single track miles, while one year—1902—football receipts went $5,767 better. Or, again, taking the average football receipts from the single yearly game for the six years—$42,774—they signify about four-fifths of the corporation's regular daily passenger receipts for last year. But this is not all: Remembering how each of the large eastern universities plays at least two "big" matches a year and how an out-of-town match depopulates the campus, probably at least 60 per cent. would have to be added for a full season's football traffic by rail. The figures are impressive enough to show the acute interest with which the New Haven corporation—and there are others—must view the present attack on the game though, *per contra*, something must be said as to obstruction of regular traffic and the perils and stress of handling great railroad crowds.

In the State of Michigan the law concerning the organization of railroad corporations is so loosely drawn that there is no requirement whatever as to the time when work shall be begun on a proposed road, and the amount of stock necessary to be subscribed before incorporation is only $500 a mile. Of this only 5 per cent. need be paid in. Thus, a company proposing to build a road five miles long can become a full-fledged corporation on putting into its treasury the sum of $125. This is about what has been done by a company recently incorporated for the alleged purpose of building a road from Dundee to Petersburg, about four miles. The organizers reported $250 paid in, but $200 of this represented the nominal value of their land, so that in reality only 2½ per cent. of their stock was paid up in cash. The matter was brought before the court on the complaint of another road which desired to build but was prevented from so doing by the holdings of the defendant company. The court held that, in order to hold its right to the property and franchise, a company must show in good faith its intention to build. To do away with these incorporations of companies which have no intention of building, but are chartered merely in order to force an unreasonable settlement from another company or prevent the construction of another road, it would seem reasonable, says a Michigan correspondent, to require that a certain amount of work be done each year, to entitle the company to hold its rights, and also to require that the road be completed within a specified length of time, under penalty of the forfeiture of these rights. And our correspondent is right, of course.

Southern Railway.

The present report is the eleventh which has been issued since the reorganization, in 1894. It will be recollected that the Richmond & West Point Terminal Railway & Warehouse Co., which went into insolvency because its existence depended upon its ability to pay the interest on speculative bonds, issued to buy speculative stocks, was the predecessor of the Southern Railway. The South was far removed from its present state of industrial activities in the '80s; the time when most of the component parts of the unwieldy system were gathered together, to be held in the weak hand of an organization that held a bare majority of their stocks. Drexel, Morgan & Co., in 1892, refused to undertake the reorganization, on the ground, flatly expressed, that there was lack of good faith among the contracting parties. The principal asset of the terminal company was the Richmond & Danville Railroad. One party to the controversy claimed that the branch roads had been leased to this company on a highly extravagant basis, the profits accruing to the insiders. The other party accused their adversaries of selling the bonds and stocks of the Georgia company (carrying control of the Central Railroad of Georgia) to the terminal company at a great profit, when buyers and sellers were directors in both companies. It may be said that Mr. Samuel Spencer expressed the matter in as conservative a way as possible when, in a letter to the Macon Chamber of Commerce in 1895, he stated that the consolidation which constituted the present Southern Railway was in part the legitimate and inevitable result of reckless and speculative construction of needless railroads throughout the South and the hopeless struggle to sustain them when built. This struggle in the absence of sufficient traffic produced unreasonable reductions, dishonest rate manipulations and unjust discriminations. At competitive points rates were unduly and secretly reduced, while at non-competitive points they were left undisturbed or possibly increased in the hopes of greater and much needed revenue. Favored individuals grew rich, favored communities apparently prospered, while all others felt outraged and many of them justly so. Mr. Spencer pointed out that railroads under such circumstances must either be consolidated to be worked more cheaply or must be left to starve separately.

Drexel, Morgan & Co. were again appealed to early in 1893, at a time when the principal concerns in the consolidation were in receivers' hands and the country was undergoing a period of general financial stringency. C. H. Coster, George Sherman and Anthony J. Thomas constituted the reorganization committee and their plan was ultimately modified in the spring of 1894 and accepted by the security holders to the extent of over 95 per cent. of the securities involved. This plan provided for the issue by a new company (the Southern Railway) of 120 millions 5 per cent. first consolidated mortgage and collateral trust bonds secured by mortgage and pledge of all the property of the new company; of 60 millions 5 per cent. non-cumulative preferred and of approximately 120 millions common stock. It was estimated that about 101 millions of bonds, 48 millions of preferred stock, and 120 millions of common

stock would be necessary for carrying out the immediate details of the plan, by which the more unwieldy of the properties in the system were to be weeded out and the rest purchased on a compromise basis, in some cases after common stock assessments.

The plan was radical and it was successful. The new common stock was at first looked on as being a somewhat comic part of the scheme, but in the years which have followed the reorganization the South has had the beginnings of an era of great prosperity. As a result, in the fiscal year for which the report is now at hand the company earned a surplus over preferred dividends of $2,151,632, a sum sufficient to have paid about 1¾ per cent. on the common.

The average mileage operated during the fiscal year 1905 was 7,199, an increase of about 35 miles, while gross earnings amounted to $48,145,108, an increase of $3,035,331. The increase in operating expenses and taxes was considerabiy less than the increase in gross earnings, leaving net earnings from operation of $13,062,594, as against $11,994,310 in 1904. It is worthy of note in this connection that along the line of the company during the year there were completed and put in operation 46 textile mills, 34 furniture factories, 38 iron industries, six tanneries, 77 stone quarries and coal mines, 13 cottonseed oil plants, eight fertilizer works and more than 500 smaller industries, while over 250 previously existing plants were enlarged during the year and 54 new industries were under construction at the close of the year. Immigration to, and the investment of outside capital in, the territory served by the Southern lines during the year exceeded any previous year in the history of the company.

Of the total gross earnings, freight contributed $31,775,326 and passengers $12,471,572. Earnings from the latter source increased over 10 per cent., the abnormallly large increase being attributable primarily to St. Louis Fair traffic. In the expense account $6,458,858, or a little over $900 a mile, was spent for maintenance of way and structures, a sum undoubtedly ample for good up-keep of the property, in consideration of the territory traversed. For maintenance of equipment $7,456,736 was spent, and approximately $2,286 per locomotive was spent on repairs and renewals.

Turning to the detail statistics of traffic, the average revenue train load is shown to have increased from 189 to 194 tons. The branch line traffic and the high comparative haulage of manufactures and agricultural products other than grain, as against the traffic in coal and in grain itself, keep the train loads low in the South. Coal constituted only 29 per cent. of the total tonnage in 1905, the next largest single item being that of lumber and logs, 16 per cent., while the total products of agriculture amounted to almost 12 per cent., of which grain contributed less than a third. General merchandise amounted to 7½ per cent. of the total tonnage. The average receipts per freight train mile were 1.83 cents in 1905, as against 1.77 cents in 1904. The average ton mile receipts were .94 cent in 1905, a figure which has remained substantially unchanged for several years. Like the majority of the other roads whose reports we have thus far reviewed, fuel cost was lower in 1905 than in 1904 on the Southern, cost per mile run under this head amounting to 8.36 cents as against 8.93 cents last year. Wages of engineers, firemen and roundhouse men were also smaller, having been reduced from 7.72 cents to 7.57 cents.

Gross earnings per mile of road increased from $6,279 to $6,688, and net earnings per mile of road from $1,669 to $1,814.

Southern Railway.

The principal statistics of the year's operation may be tabulated as follows:

	1905.	1904.
Average mileage	7,199	7,190
Passenger Earnings	$12,471,572	$11,327,683
Freight earnings	31,775,326	30,053,989
Gross earnings	48,145,108	45,147,483
Maint. way and structures	6,458,858	5,722,835
Maint. of equipment	7,456,736	7,263,526
Conducting transportation	18,195,504	17,351,632
Operating expenses and taxes.	35,082,515	33,150,298
Net earnings	13,062,594	11,997,184
Gross income	14,442,065	13,132,728
Net income	5,151,632	4,180,400

NEW PUBLICATIONS.

Modern Locomotive Engineering. By Calvin F. Swingle, M. E. Chicago: Frederick J. Drake & Co., 1905. Leather, 4¾x6¾ in.; illustrated; 630 pages, including index. Price, $3.

This is a plain, practical treatise on the construction, care and management of modern locomotives. Boiler construction as applied to locomotives is dealt with in detail and all the leading types of valves and valve gears are fully described. An entire chapter is devoted to a study of the indicator and its application, and the different types of compound locomotives receive special attention. Locomotive equipment, including electric headlights and mechanical stokers as well as the air-brake are treated more or less at length. Particular attention is given to breakdowns and what to do in cases of emergency. The book is primarily designed for the use of those who are seeking to fit themselves as locomotive engineers. Therefore the elementary features pertaining to the oper-

ation of the locomotive are first taken up, and the discussion gradually progresses through all of the various stages in the making of a first-class engineman. The author has arranged a list of questions at the end of each chapter. The student is thus made to search for the answers, which will always be found in the preceding chapter. By this method the author thinks that the student will be more apt to have the answers fixed in his mind than he would if the answers were ready made for him and inserted after each question.

TRADE CATALOGUES.

Pressed Steel Poles.—Illustrations and descriptions of pressed steel poles made from rolled structural pressed steel are given in a neat pamphlet published by the Pressed Steel Pole Company, Pittsburg, Pa. These poles are now being used for various purposes such as telegraph, telephone, trolley, electric light, and for semaphore and signal work. The Pressed Steel Pole Company also make steel and wood fittings for these poles such as cross-arms, collars, clamps, brackets, steps, etc.

Pneumatic Appliances.—Special Circular No. 55, which is being distributed by the Chicago Pneumatic Tool Company, Chicago, illustrates and describes a number of pneumatic devices specially designed for foundry and concrete block work. Notable among these tools are "Chicago" and "Keller" pneumatic sand rammers and the "Chicago" sand sifters. Illustrations of pneumatic hammers and drills are also shown. Some data in regard to concrete block making such as the proper proportions of materials to use and the method of coloring the same is also given.

Valves.—A pamphlet containing illustrations and price lists of extra heavy valves for pressures above 150 lbs. is being distributed by Jenkins Bros., New York. The valves illustrated include brass globe, check and Y valves, as well as extra heavy iron body globe and angle valves.

The Rodger Ballast Car Co. has just published a pamphlet pointing out the adaptability, economy, simplicity, durability and practicability of the Rodger Ballast Hart Convertible cars. Their principle designs are described and illustrated with half-tones and line drawings.

Graphite.—The January issue of "Graphite," published by the Joseph Dixon Crucible Co., Jersey City, N. J., is just being distributed. It contains a number of interesting articles on graphite and its uses as well as an article by W. H. Wakeman on "The Location and Use of Friction Clutches." The usual amount of amusing and light reading matter is distributed throughout its eight pages.

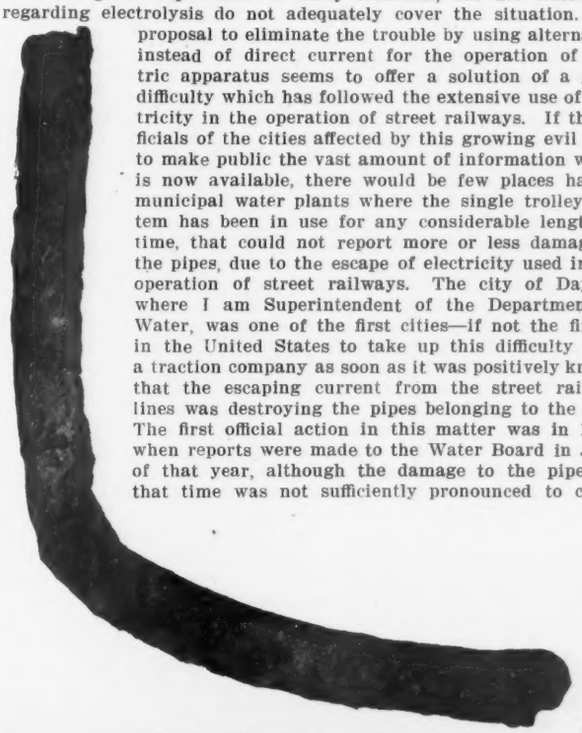
CONTRIBUTIONS

Destruction of Water Pipes by Electrolysis.

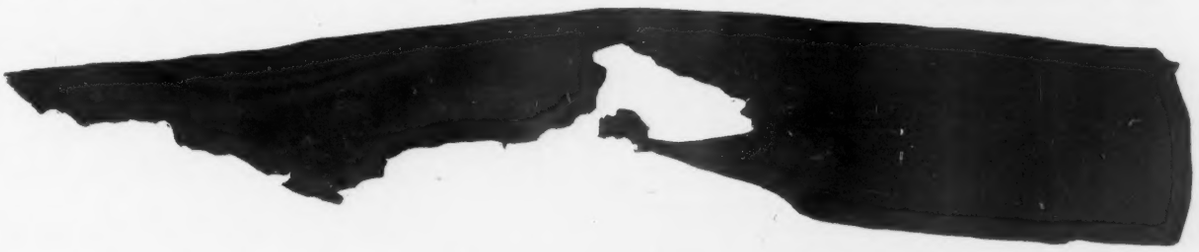
Dayton, Ohio, Dec. 26, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The letter by Mr. Geo. Westinghouse in your issue of December 22 is of great importance to many interests, but his statements regarding electrolysis do not adequately cover the situation. His proposal to eliminate the trouble by using alternating instead of direct current for the operation of electric apparatus seems to offer a solution of a great difficulty which has followed the extensive use of electricity in the operation of street railways. If the officials of the cities affected by this growing evil were to make public the vast amount of information which is now available, there would be few places having municipal water plants where the single trolley system has been in use for any considerable length of time, that could not report more or less damage to the pipes, due to the escape of electricity used in the operation of street railways. The city of Dayton, where I am Superintendent of the Department of Water, was one of the first cities—if not the first—in the United States to take up this difficulty with a traction company as soon as it was positively known that the escaping current from the street railway lines was destroying the pipes belonging to the city. The first official action in this matter was in 1898, when reports were made to the Water Board in July of that year, although the damage to the pipes at that time was not sufficiently pronounced to cause



Lead Service Pipe Removed After 11 Years.



Service Gas Pipe Removed After Three Months.

Pebbles Removed from Under Washington Street Showing Deposits from Cast-Iron and Lead Pipes.

alarm to those in charge of the Water Works Department. Up to that time none of the main lines had burst, due to deterioration by electrolysis, although a number of service branches had already given way and naturally had raised a question of how long it would be before it would be shown that the escaping electric current had weakened the main lines sufficiently to cause them to burst. The great damage to the city mains in the interim has proven that the loss is, if anything, greater than anticipated. Within the last 90 days the city has been obliged to abandon or remove as junk about 1,600 ft. of main line pipe on one street alone, which had been destroyed by the electrolytic action of the street railway current. To avoid excavating under the car tracks in the future when it may again be necessary to make repairs, there has been placed a line of pipe on each side of the street, with short service connections to the curb. These two lines of pipe were not laid with the idea of overcoming the electrolytic difficulty, for the conditions so far as current is concerned have not been perceptiby changed, so that the pipe which has just been put in will in time go through the same course of destruction as the line which was abandoned. Those in charge of municipal water works and who might be required to make such a change as above mentioned on paved streets, can form some idea of the expense involved and of the annoyance and inconvenience to the public. There seems to be no possible way in which the pipe system can be so insulated where direct current is used as to sufficiently control the current to prevent electrolysis, although many devices have been bought and put into use, such as additional bonding, auxiliary wires placed adjacent to the street car rails, and the rails themselves cross bonded and additional overhead return feeders, which expedients have not had the desired effect. The accompanying photographs show the destructive electrolytic effects experienced at Dayton.

CHAS. E. BOWE,
Superintendent, Department of Water, Dayton, Ohio.

Setting Valves with Walschaert Valve Gear.

Harrisburg, Dec. 31, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your issue of Dec. 29th, in which a criticism of my article, entitled "Setting Valves with a Walschaert Valve Gear," was published. The article was not written with the intention of giving a theoretical discourse on the design and setting of this gear, but primarily to call attention to its direct and indirect motion, which materially lessens the labor of valve setting. I did not endeavor to touch upon every feature and combination of valve stem tram marks, but simply gave two as an illustration of the movements; relying on the fact that any experienced valve man could figure out what would have to be done in other cases.

Contrary to the assumption of my critic I was fully conversant with the facts regarding the ratio of lever arms between the eccentric rod and valve stem, but Mr. Harding has failed to consider that the slip of the "link block" in this case, together with the fact that the "radius rod" does not act directly from link block to valve stem but by another system of levers made more complicated through the alternate position of the fulcrum, will alter the constancy of the ratio 3 to 1. He should also know, from experience, that theoretical changes in link motion do not always give the required results in practice. For this reason it is customary, among railroad valve men, to learn by practice a method that will give them results; and the one-quarter mentioned by me in my article, as added for lost motion, is the amount supposed to cover all causes that tend to throw the valves out of square. It makes no difference what path we pursue as long as we arrive at correct results, but no man will set valves without allowing for some lost motion when making his alterations.

THOMAS F. CRAWFORD.

A Difficulty With Distant Signals at Junctions.

New York, Dec. 26, 1905.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to my communication in your issue of Oct. 27th, my suggestion of separate masts or dolls at junctions was based upon the difficulty experienced in finding suitable positions for the distant signals for branch lines, where the sections beyond the point of divergence were so short as to make it imperative to place the signal somewhere in the vicinity of that point of divergence. The difficulty was best overcome by placing the distant signal of one section on the home signal mast of the rear section. This was unsatisfactory because it crowded too many signals on one mast. Hence the idea of using several masts or short dolls spaced as near together as practicable, thereby providing a good position for a distant signal when required. I may say that I reluctantly arrived at this conclusion because it is opposed to the ideal of placing every signal in the same vertical line, relative to the track governed. Is there not under existing conditions a better way of solving the problem? If it be granted that the correct and only positions of the distant signal are 45 deg. and vertical, and this is adopted in practice, the difficulty would be met by making the home signal a three-position signal, using the "caution" and clear positions as distant signal for the next section.

HENRY JOHNSON.

An Open Letter to Mr. Westinghouse.

So your reference to me in your recent letter to the *Railroad Gazette* was "not intended to do Mr. Sprague an injustice"; that is probably the reason why it was written and spread broadcast. Those who have the patience to follow this subject will quite likely reserve to themselves some right of judgment, and will be able to form a correct opinion as to your real motives.

Contrary to your suggestion, I did not forget to mention anything of pertinence, or proper public interest in so far as it concerns my comments on the adoption under existing conditions of a. c. locomotive operation on the New Haven terminal division, but in order to confine myself to that particular case, and to avoid being wrongly, even if with apparent reason, put in a position of antagonism to any rational application or development of the a. c. system, I did omit many things which might with entire truth have been said concerning the special difficulties naturally being experienced in that development, and many other things which my official relations would not permit me to say.

But in spite of my moderation you have made references to my contracts which are incorrect as to fact, and foolishly untrue in inference. Permit me to correct you as to both, for if the public is at all interested in any personal discussion between you and myself, it might as well know the exact state of affairs.

I have at present a contract with the Sprague Electric Company, an extension of one I have had for a number of years, during which time it was an active competitor of the principal electric companies. By this contract it became the owner of my patents, and it has naturally and very properly restricted me from engaging in rival manufacturing, or advising those who are so engaged.

Further, in part liquidation of a royalty agreement covering the use of the "multiple unit" system, I agreed to accept an annual payment during the term of the patents covering that system, if living, and required a guaranty that my name should always be used as designating it, not only by the Sprague Company but by any successor or licensee of it. But whether those patents be used or not, this payment is not affected by a penny's worth, nor by any other act of mine. The contract makes no mention of any railroad corporation, nor is any such intended, and it is a rare order of imagination which would convert the railway and power transmission companies of the country, the customers of the great electrical manufacturers, into corporations which may be classed as unfriendly to them.

This contract, under present conditions, confers upon the officials of the General Electric Company no authority whatsoever, so far as I am concerned, and no man knows better than yourself that I would brook no interference by individual or corporation with my professional opinion or action when engaged as a consulting engineer.

I have in addition a contract with the General Electric Company, a brief one, whose sole provision is a guaranty that the Sprague Company shall fulfill its obligations to me, the chief of which, in my opinion, is the use of my name in connection with all multiple unit apparatus, no matter what the details.

Such is the legal status of my contracts, and it is in no sense altered because the General Electric Company is now the owner of the stock of the Sprague Company, or because it may become its successor in the event of that company's assignment or liquidation. I cannot, therefore, recognize your privilege to interpret these contracts in a light contrary to their spirit, or in any manner other than is mutually acceptable to the present parties to them, even if it may serve your personal purposes to do so.

But assuming, despite your forgetfulness and inaccuracy, that in place of the Sprague Company, the General Electric Company becomes the principal, by whatsoever official action of the Sprague Company, with what poor grace comes your attack on me when by reason of that very fact, because of agreements between your own and the General Electric Company in force for the past ten years, you would become, under like terms, the direct beneficiary of every patent advantage thereby derived, and the indirect beneficiary by my abstention from manufacture.

You have said that I have a "particular personal interest" in my "own form of control," and thereby attempt to differentiate the apparatus built by your company. You are, of course, aware that I have here no monetary interest whatever in its use, and it would have been nearer the truth had you stated I had a pardonable and personal pride in a system absolutely of my creation which has revolutionized electric train operation, a system which you are

widely using, and in whose adoption to your special requirements you have the active aid of my former confidential assistants. Were you as careful to recognize the rights and equities of others as you are tenacious in upholding of your own, you would not let an hour pass before directing in this instance the proper recognition of my name, instead of waiting until the slow and tedious process of law may compel such acknowledgment.

The true inwardness—and the littleness of your reference to me lies in its suggestion that I am not independent enough to pass upon the merits of a proposal submitted to me, or that the New York Central Commission has not accorded your company fair treatment. So far as my friends are concerned I need no defense, for they know that my engineering instincts rise supreme above any personal interest when acting in an advisory capacity, and the New York Central can best answer whether I have maintained the standard which it exacts from all who serve its interests.

A single fact, and not the only one with which you were conversant, should have made you more cautious in your reference to me, for you well knew when you penned your letter that despite your assertion that natural inclination would lead the New York Central Railroad to award contracts, if it could do so on a sufficiently favorable basis, to a manufacturing company whose works are upon its lines, you had been awarded one of the most important contracts in its equipment, that for 27,000 kilowatts of rotary converters, with my full accord and approval.

It is to be regretted that in reflecting upon that commission you seem to have forgotten its composition. Permit me to remind you that as one of its members it has been my pleasure for a considerable portion of the time to be associated with the then vice-president of an organization absolutely controlled by Westinghouse interests, but although we often for a time may have disagreed, in all the deliberations which affected the New York Central interests I have done myself the honor to give him, as I believe he gave me, the credit of recognizing in the highest degree the judicial character of our positions.

As you well know, the decision affecting the present equipment of the New York Central Railroad has nothing whatever to do with future extensions. It was dictated in part by local conditions which are just as distinctive and determinate to-day as when the equipment was decided upon. These reasons have been time and again set forth, and both collectively and individually the Commission has made it clear that its decision was not necessarily to be taken as a precedent, that there was no antagonism to any particular system, and that when the problem of such extensions should come up every possible advantage would be taken of electric developments of any nature and from any source. Hence the attempt to get the New York Central Railroad to abandon matured plans, to terminate its contracts, and to adopt your proposal for a change of its equipment, in so far as such proposal could be influenced by cost comparisons extending to the balance of its system, is without the slightest basis of reason, nor was it helped by estimates which being wide of the facts are utterly worthless.

I find myself, with others, wondering what has caused your somewhat rabid general denunciation. Is it a tardy realization of the importance of my letter, now ten weeks old, or appreciation of its truth, or changes in some of the original intentions of the New Haven Company, or difficulties which have manifested themselves on existing a. c. equipments, or in the carrying out of the New Haven project? Perhaps it was the loss of the Camden and Atlantic City line to a direct current equipment, or an important single-phase road to a rival—but these are the fortunes of war, and a saving sense of humor will prevent an attack of melancholia. Perchance some coolness in the reception of your ex-parte statements, privately circulated a month ago, and now in part made public, has made necessary an attempt to bolster them up, but in any event, your position will hardly be strengthened by over zeal, or misdirection of statement, even when illustrated by exceptional cases of electrolysis, easily avoided and having little bearing upon the general railroad problem.

You take personal offense because I have pointed out some of the difficulties which will naturally characterize the progress of the a. c. development, and the special ones which it challenges in a particular case, and have essayed to make it appear that my opinions were dictated by a spirit of special friendliness to another company. Permit me to inform you that I have on frequent occasions stated that whatever excuse there may have been for the enthusiasm of your engineers—and there was much—there would have been little for those of the General Electric Company for making a similar proposal under like conditions, because they, probably even better than your own men, knew the limiting conditions.

Had the New Haven road restricted its equipment, as seemed to many for the time wise, and for the special reasons adopted in a limited territory direct current operation, it would not, contrary to your statement, have necessarily meant apparatus of General Electric manufacture, for as I have already pointed out an equal right of construction lies with your own company. Nor save on the one question of locomotive pooling was their any need for restriction in the details of apparatus.

I stood in that matter as I hope I may always stand, for what I believe to be the best interests of the public and the electric railroad development, irrespective of any personal interests or business affiliations; and had my criticisms lacked the essential elements of truth and common sense one would have supposed that in the supreme confidence which you profess you would have been content to have awaited the issue, and to have witnessed my discomfiture and the acknowledgment of the error of my ways and opinions, which I think in that event I am broadminded enough to have made. But I have ample reason to believe that, distasteful as my criticisms may have been to some, when measured by public convenience and safety results of importance have already been accomplished, and even more are sure to follow.

The charge that the General Electric Company and myself are engaged in a conspiracy to fasten upon the railway world the direct current system as opposed to the alternating current or any other particular system unduly enhances my importance, and is an amusing product of imagination, or the results of hysteria.

I must remind you that I was probably the first engineer in this country to recommend, in an official report some 15 years ago, the general adoption of alternating current for the transmission of power over long distances, and I have not changed my attitude since. I have also to call your attention to the fact that not only have I steadily advocated higher potentials, but several years ago I publicly expressed the desirability of the development of single phase motors for use on electric railways. And in order that you may not unchallenged appropriate to yourself all initiation in this art, I must not forget to mention the late lamented Charles Van Depoele, whose name you may be familiar with, who in addition to much other admirable pioneer work, some 16 years ago advocated and patented a method of using single phase currents on electric railways.

In instructive contrast to your assumption as to my affinities, it is a curious coincidence that at the very time of the issue of your letter I should have committed myself to a belief in the possibilities, and stated my readiness to assume the responsibility under some circumstances, of a d.c. operation at a potential three times as high as your engineers have fixed in making comparisons between the two systems, a potential which, it is proper to point out, has not yet received the endorsement of your own or the General Electric Company. I therefore can hardly be accused of speaking for either in thus taking this public stand, but rather as the representative, as I have always tried to be, of consistent advance by all lines in an art to which I have devoted my life.

You object to healthy criticism, but in your self-constituted position as universal engineering advisor and mentor, has the New York Central, or its Commission or the General Electric Company been free from such? On the contrary, you have been unsparing in predictions of failure. The use of the particular turbines selected was to be followed by a frightful accident and their replacement by your own, and the locomotives were destined to absolute failure; but the former seem to function satisfactorily, and the latter has a record as yet unequaled by any like piece of apparatus. True, you made no predictions of failure concerning that admirable part of the equipment which your company is to supply, although now so energetic in condemning its use elsewhere.

Your attack on me is misjudged, and is unworthy of your own dignity, for even if your personal qualities do not appeal to the softer side of my nature, and your assumptions do not always carry conviction, I still recognize in you many elements of greatness. It will therefore fail in its purpose, for it will not cost me a single friendship, and will not impair the confidence of my associates, nor do I believe it will adversely impress any fair-minded man though he be a stranger to me. I will go further—it will not affect my appreciation of the many splendid products, or affect my final judgment concerning any developments or proposals of the Westinghouse Company, which will live on even after your dominant personality in its affairs disappears.

Permit me in conclusion to remind you that my work and inventions have been among the stepping stones to your great fortune, and while others, and not I, have reaped the larger material rewards of that pioneer work, I have at least succeeded in impressing my name upon the electric railway development in such indelible fashion that you cannot erase it. It has never stood for doubt, or cowardice or fear of consequences, but always for advancement—in which in many important particulars you have followed, not led me.

My engineering convictions and conclusions are my own. They are dictated by no man or corporation. I am not the advocate of the use of any particular system to the exclusion of any other, but rather of higher potentials and the greatest measure of development by whatever means—for such system as in any particular case shall, when measured by all conditions of equipment and operation best fulfil the requirements of that case.

That attitude is one which I shall consistently maintain, unchanged by clamor, pressure or disapproval, and so long as I am given life and strength, and retain the confidence of my associates, I shall help carry to success the enterprise which you have so freely

criticized, and thus aid in planting another milestone to mark the advance of electrical accomplishment. FRANK J. SPRAGUE.

New York Central & Hudson River R. R. Co., Grand Central Station.
New York, Jan. 2, 1906.

Mr. Frank J. Sprague, 20 Broad street, New York City.

Dear Mr. Sprague: Referring to recent discussions in the public press, in which your name has appeared in connection with decisions of our Electric Traction Commission:

It affords me pleasure to state that the relation that you hold to other interests has always been free and open to me, and that your attitude toward the different bidding companies has been entirely unbiased and impartial, as evidenced by your advocacy of what you have considered to be the apparatus best suited to our needs, no matter by whom manufactured.

Yours sincerely,

W. J. WILGUS,
Vice-President.

Dec. 29, 1905.

General and Sprague Electric Companies, New York City.

Gentlemen: I call your attention to a letter signed by George Westinghouse which appears in the *Railroad Gazette* of December 22d, and is repeated in other journals, in which, referring to my critical attitude concerning the adoption of alternating current locomotives by the New Haven Railroad under existing conditions, he makes the following statement:

"Mr. Sprague forgot to inform the public, probably as he would have done had he had more time, that he is receiving a very large retainer under a contract of years' duration, whereby, though he may become Consulting Engineer for a railroad, yet he cannot do so if, in the opinion of the officials of the General Electric Company, such work or obligation may be in conflict with the interests of that company."

My only contract with the General Electric Company is a brief one, simply guaranteeing the fulfilment of the Sprague Company's obligations to me, and although my contract with the latter company—which bought my patents—is intended to prohibit my engaging in rival manufacture or consultation for a manufacturer engaged in a like business, I am not aware that even if the General Electric Co. has bought the Sprague Co. there is any reasonable ground for assuming that the officials of either company have the remotest right of interference with my legitimate work, for it is only proper for me to say that such attitude would be distinctly opposed to my views.

I beg, therefore, to inquire if there is in your understanding of my contracts any justification for Mr. Westinghouse's inference, or anything which would in your opinion entitle you to such prohibition, or which would interfere in the remotest degree with such action on my part as may be dictated by the very highest interests of my clients.

An early reply will be appreciated.

Very truly yours,

FRANK J. SPRAGUE.

General Electric Company.
Principal office, Schenectady, N. Y.
New York office, 44 Broad street.
Jan. 2, 1906.

Mr. Frank J. Sprague, 20 Broad street, New York.

Dear Sir: Referring to your letter of Dec. 29, 1905, our policy is, as you know, to refrain from entering into a controversy in the newspapers over any particular system advocated either by our companies or by their competitors.

It is solely on account of your personal relations to the various traction interests of the country that we are writing this letter.

There is no reason, so far as the General Electric and Sprague Companies are concerned, why you should not act as Consulting Engineer for any steam railroad or for any power company, nor any reason why you should not give such companies for whom you act as Consulting Engineer such advice as seems to you proper, regardless of whose apparatus is to be used.

The General Electric Company and the Sprague Company are doing their utmost to develop the electrical art along all lines instead of wasting time in personal recriminations. These companies give the best engineering advice of which they are capable on the various propositions which are from time to time submitted to them, and if in any proposals which they may make for the equipment of steam roads, your judgment prompts you to decide in favor of a system which is recommended by their competitors, we feel sure that you will not hesitate for one moment to recommend such system.

The General Electric Company is in the business of manufacturing electrical apparatus, and is prepared to furnish alternating or direct current systems as may be suitable. It has perfected what it believes to be the best alternating current railway system in the world, and wherever the circumstances make the use of such a system desirable, it recommends its adoption in preference to the direct system. The company does not, however, endeavor to force either system on the customer irrespective of the best engineering practice with reference to the special conditions under which the system is to be operated.

Very truly yours,

GENERAL ELECTRIC COMPANY,
By E. W. RICE, JR., *Third Vice-President.*
SPRAGUE ELECTRIC COMPANY,
By ALLAN BAKEWELL, *President.*

The Cost of Locomotive Operation.

XIX.

BY GEORGE R. HENDERSON.

(*Continued from Vol. XXXIX., page 592.*)

UP-GRADE WORK.

In order to study the effect of speed and loads on up-grade work, let us consider a division 150 miles long and uniformly graded to 1 per cent. We will at present study traffic only one way, that is up-hill, as returning, an engine could take almost any train load within reason. We will assume that the division is equipped with the size of consolidation engines used in developing, Figs. 1 to 10, (see *Railroad Gazette*, March 31, 1905, page 312), weighing 150 tons with tender, and having an available tractive force of 40,000 lbs. As freight trains are ordinarily run at speeds of less than 30 miles an hour, we will study the results at five miles and multiples of 5 up to 30 miles per hour. Table A gives six columns (besides the data headings) for values from 5 to 30 miles, and line one indicates the speed considered. Line two gives the weight of train in tons, back of tender, and is the maximum that the engine can take on a 1 per cent. grade at the speeds indicated. These weights are obtained by superimposing Fig. 8 on Fig. 2 (as has been already explained in connection with these diagrams), and noticing where the intersection of speed lines and curve b c are projected on Fig. 8. Thus we see that while 1,450 tons could be hauled at five miles an hour, only 400 could be taken at 30 miles. (It is necessary to draw additional curves on Fig. 8 below the 1,000-ton curve, but this is readily done by the help of formulæ 4 and 6.)

Line three gives the ton-miles per trip, back of tender, and is simply the weight of trains multiplied by 150, the division length in miles, thus $1{,}450 \times 150 = 217{,}500$ ton-miles. Line four denotes the running time, or 150 divided by the running speed, as in the five-mile column $\frac{150}{5} = 30$ hours. There will always be delays, however, and we have assumed that these will amount to 20 per cent. of the running time, so that line five, the actual time between terminals, is 20 per cent. in excess of line four: thus, $30 \times 1.20 = 36$ hours.

Now, by dividing the distance 150 miles by this latter figure, we obtain the average speed between terminals, shown in line six; as for instance $\frac{150}{36} = 4.2$ miles per hour. Line seven indicates the amount of coal burned per mile for the weight of train and speed given in lines one and two. These values are obtained from Figs. 2 and 8 as explained in the chapter on fuel, being read directly from the diagrams. It will be noticed that at 10 miles an hour, 800 lbs. may be burned per mile, while at lower and higher speeds the value is less. This, of course, assumes that the maximum loads for the different speeds are taken. The coal burned per trip, line eight, is simply the product of line seven, and the distance, thus $500 \times 150 = 75{,}000$ lbs. of coal.

In the chapter on water, we found that we could ordinarily consider the quantity of water in gallons used by a locomotive as three-quarters of the amount of coal burned in pounds, or a consumption of three-quarters of a gallon for every pound of coal. Line nine therefore is uniformly three-fourths of line eight; for example, $75{,}000 \times \frac{3}{4} = 56{,}000$ gal. approximately.

We have now obtained the quantities of coal and water for each trip, and can commence to insert cost values. Line 10 gives the cost of coal per trip, and we will first allow a price of one dollar per ton of 2,000 lbs. Thus the first figure in line eight being 75,000 lbs., or $\frac{75{,}000}{2{,}000} = 37.5$ tons, represents a value of $37.50, and the other values follow in the same manner. We can take water at 10 cents per 1,000 gallons, and figure the amounts for line 11: for instance, 56,000 gal. will be worth $5.60.

When we come to the cost of lubrication, we must refer to the chapter on waste. As we are working upon a freight engine with 21-in. cylinders, the cost of lubrication may be expected to run about $3.06 per 1,000 engine-miles. This gives us $3.06 \times .150 = .50$, or 50 cents per trip. Under our discussion of this subject it was considered that this cost was affected very slightly by the train load and speed (within moderate limits) so that the amount of 50 cents will apply to the several columns selected for line 12.

The cost of supplies (line 13) was stated to approximate 20 cents per trip, which accounts for that value being set in all columns.

Line 14, cost of repairs, is figured on the "Tractive Force Tons

Per Mile." From Fig. 8, at the intersection of the load curves and the speed lines, we find the resistance of the train, including the engine and tender. As this corresponds to the tractive force needed, we obtain directly the figure needed. For instance, 1,450 tons at five miles an hour (including 150 ton engine and tender) on a 1 per cent. grade, require a tractive force of 40,000 lbs., or 20 tons. The allowance (from chapter on repairs) was to be 1 cent per ton tractive force per mile plus 1 cent per engine mile. As the grade is uniform (in the case being considered) there will be 20 tons exerted throughout the trip and we shall have 20 ton miles + 1 engine mile, or 20 + 1 = 21 cents per mile run, and for 150 miles, .21 × 150 = $31.50 for repairs, including general and running repairs. The other values of line 14 are obtained in the same manner. Thus at 25 miles an hour the maximum available tractive force (see Fig. 2) is 20,000 lbs., or 10 tons. So 10 + 1 = 11 cents and .11 × 150 = $16.50, representing the value of repairs for this trip.

Allowance for renewals (line 15) must be taken more or less arbitrarily, and as we previously proposed one cent per engine mile, we have figured this item at $1.50 per trip of 150 miles for all the speeds considered.

Line 16, pay of engineer and fireman, must be taken from our schedules for this item. If we use schedules 3 and 3f we find for this size engine in freight service a rate for enginemen of $4.25 per 100 miles, and for firemen $2.75, a total of $7 for 100 miles or less. The overtime rate is at 10 miles an hour, and as the average speed of the five-mile an hour run is only 4.2 miles per hour, the whole 36 hours occupied will be figured at overtime rates, or 70 cents an hour, so that 36 × 70 = $25.20. At 10 miles an hour (8.3 average speed) we obtain 18 × .70 = $12.60 for the trip, but at higher speeds the rate is uniformly on the mileage basis (as the average speed exceeds 10 miles an hour), or 1.50 × 7.00 = $10.50.

For cost of handling at terminals we found that, including hostling, turning, wiping, inspecting, cleaning fires, firing up and calling, the expense would run about $1.50 per turn, and if we allow 50 cents more for washing out and coaling, we can fill out line 17 by inserting $2 in each column. Line 18 covers the interest allowance, and is deduced as follows: A locomotive such as we have selected will cost in the neighborhood of $18,000, and at 5 per cent. will represent an annual charge of $900. The rate per day is therefore $\frac{900}{360}$ = $2.50, or say 10 cents per hour. This charge goes on whether the engine is on the road or in the house, and if we assume that five hours are needed for turning and running repairs, we get a total for the trip and lay-over of 36 + 5 = 41 hours, and at 10 cents an hour the amount is $4.10. So for the other speeds—at 30 miles an hour, or six hours actual time on the road, we have 6 + 5 = 11, or $1.10.

We now have all the charges entering into the cost of operating the locomotive over our typical division, and by summing the amounts from lines 10 to 18 inclusive we obtain the "locomotive cost" per trip, line 19. It is interesting here to note that this total cost is a maximum at or about 10 miles an hour running time, or 8.3 miles average time on the road, allowing 20 per cent. for delays.

In order to obtain the cost of transportation, however, which is the vital point, we should also include the train supplies, car repairs, and pay of trainmen, as these will vary in accordance with our speed and load. The first of these, "train supplies," will depend partly upon the number of cars in the train, though the largest portion will probably depend more upon the "train mileage" than the "car mileage." We can therefore assume this figure at 1.5 cents per train mile, and this gives us a uniform value of $2.25 per trip for line 20.

Car repairs (line 21) could, perhaps, be omitted from consideration here, as it is presumed that there is a definite amount of traffic to be handled, and consequently a certain amount of car mileage must be made, but in order to complete the estimate of "train charges," a value will be given to this item. One-half cent a car mile is probably a fair average for cost of repairs, and as the average weight of loaded cars is not far from 33 tons, we have .5 ÷ 33 = .015 cent per ton-mile, or 15 cents for 1,000 ton-miles, which value we shall use in our present discussion. In the first column, then, we have 217.5 × .15 = $32.60 (about), and so for the other values—the last column giving 60 × .15 = $9.00 per trip.

Line 22 considers the pay of trainmen (back of engine) and assumes the following rates: Freight conductors, $89.70 per month for 2,600 miles in 26 days; for excess mileage, the same rate is allowed, viz., 3.45 cents per mile. Overtime is allowed whenever the speed is less than 10 miles an hour, and is computed at the rate of one mile for each six minutes overtime. Freight brakemen receive $59.80 per month of 2,600 miles in 26 days, or 2.3 cents per mile for excess mileage, overtime being arranged in the same way as for conductors.

If a train crew is composed of a conductor and two brakemen (as is usual), the combined rate is 3.45 + 2.3 + 2.3 = 8.05 cents per mile, or 80.5 cents per hour. As for the enginemen, the first two schedules will be on the hourly basis, and the remainder on a mileage basis. Thus, 36 × .805 = $28.98 for the five mile column, 18 × .805 = $14.49 for the 10 mile, and 150 × .0805 = $12.08 for the others, where the average speed exceeds 10 miles an hour.

This completes our tabulation, and by adding the figures in lines 19 to 22 inclusive, we obtain the total transportation cost, as far as the train movement is affected by speed and loading at least, as shown by line 23. Track and superintendence expenses are, of course, omitted, as it would be practically impossible to vary these in proportion to individual train loads and speeds, particularly as a definite ton-mileage (all that is offered) must be transported in any case, and the other expenses will be nearly the same, no matter whether the trains are heavy or light.

By line 23 we find that the greatest cost of train is at five miles an hour running speed, and with the heaviest load, though the cost does not decrease in proportion to the latter.

In line 24 the cost per 1,000 ton-miles (back of tender) is obtained by dividing line 23 by line 3, thus $\frac{171\ 93}{217.5}$ = .79 (approximately). This line is of great interest, as it gives the best basis for comparison of costs; it will be observed, however, that it includes the weight of cars, and only covers the operating expenses as noted in the several headings. The total expenses will be nearly three times as great, and if the loading and cars are of equal weight, the total cost per revenue ton-mile will be five or six times as much as shown. But we are here considering the cost of the actual movement of gross tonnage back of the tender. Examination of line 24 indicates that for the conditions assumed, the lowest cost is obtained at 15 miles an hour, though the lower speeds are only slightly greater in cost. As the speed is increased, however, above 15 miles, the expense goes up rapidly, and at 30 miles it is 50 per cent. more than from five to 15 miles per hour. Thus we see why stock and fast freight trains are so much more costly to move than ordinary slow or dead freights, largely owing to the fact that the crews are paid by the mile at high speeds, and the weight of train is reduced to permit the engine to attain the desired velocity. At very slow speeds, the hourly rate comes into the calculations, and again runs up the cost.

TABLE A.—*Maximum Loads, 150 Miles of 1 Per Cent. Grade.*

1. Running speed, miles per hr.	5	10	15	20	25	30
2. W't train, tons bk of tender	1,450	1,430	1,100	800	560	400
3. Ton-mls pr trip, bk of tendr.	217,500	214,500	165,000	120,000	84,000	60,000
4. Runn'g time, hrs. bet. trmnls	30	15	10	7.5	6	5
5. Actual time, hrs. bet. termnls	36	18	12	9	7.2	6
6. Average speed bet. terminals.	4.2	8.3	12.5	16.7	20.8	25
7. Coal burned, lbs. per mile...	500	800	540	400	320	250
8. Coal burned, lbs. per trip....	75,000	120,000	81,000	60,000	48,000	37,500
9. Water used, gallons per trip	56,000	90,000	61,000	45,000	36,000	28,000
10. Cost of coal, per trip.....	$37.50	$60.00	$40.50	$30.00	$24.00	$18.75
11. Cost of water, per trip.....	5.60	9.00	6.10	4.50	3.60	2.80
12. Cost of lubrication, per trip.	.50	.50	.50	.50	.50	.50
13. Cost of supplies	.20	.20	.20	.20	.20	.20
14. Cost of repairs, per trip....	31.50	31.50	26.25	20.20	16.50	14.25
15. Allowance renewals, per trip	1.50	1.50	1.50	1.50	1.50	1.50
16. Pay of enginemen, per trip..	25.20	12.60	10.50	10.50	10.50	10.50
17. Cost of handling, per trip...	2.00	2.00	2.00	2.00	2.00	2.00
18. Interest allowance, per trip..	4.10	2.30	1.70	1.40	1.22	1.10
19. Locomotive, cost per trip....	108.10	119.60	89.25	70.80	60.02	51.60
20. Cost, train supplies, per trip	2.25	2.25	2.25	2.25	2.25	2.25
21. Cost of car repairs, per trip	32.60	32.10	24.80	18.00	12.60	9.00
22. Pay of trainmen, per trip...	28.98	14.49	12.08	12.08	12.08	12.08
23. Cost of movement, per trip..	171.93	168.44	128.38	103.13	86.95	74.93
24. Cost per 1,000 ton-miles, net.	.79	.79	.78	.86	1.03	1.25
25. Million ton miles, per engine, per month	3.82	6.70	6.98	6.18	4.96	3.92

While line 25 is not entirely rational, it is of a good deal of interest. By not being rational we mean that a division of 1 per cent. up grade in one direction would necessarily return its engines down hill, and they could take heavy trains and make high speeds without being dependent upon the power of the locomotive. The values given in this line have been obtained by dividing the number of hours in a month of 30 days (720 hours) by the hours needed for a trip and lay over, in order to get the trips per month that could be made on the schedule considered, and multiplying by line 3 the ton-miles per trip, and dividing, of course, by 1,000,000. Thus for column under five miles an hour we have $\frac{720}{41} \times \frac{217,500}{1,000,000}$ = 3.82 million ton-miles per engine per month, and it is evident that this merely indicates the "rate" of doing work while ascending the grade—the down-hill movement would alter these figures very considerably; still, as we are considering up-hill traffic only, it is interesting to compare the various rates of producing ton-mileage. The most important point to notice is that at 15 miles an hour running time (12.5 miles average speed) we are able to produce the greatest amount of transportation per engine in service, and this is also the schedule for minimum cost. Under the conditions which have been assumed therefore, if we run at 15 miles an hour, we not only do the work cheapest, but get the most of it done.

It will also be observed that while a running schedule of five miles an hour will maintain the cost of transportation at practically the same figure, but little more than half the transportation will be produced, and that with long hours and tired-out crews, whereas the 15 mile schedule will bring the trains to the end of their runs in good time.

It must not be taken for granted that this condition will obtain

for all combinations of costs, pay and profiles, but it is significant that actual tests on several important roads have confirmed these figures. (Later we will estimate other profiles in order to compare the results.)

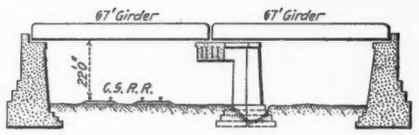
(To be continued.)

Newell Grade Separation of the Wabash and Chicago Southern.

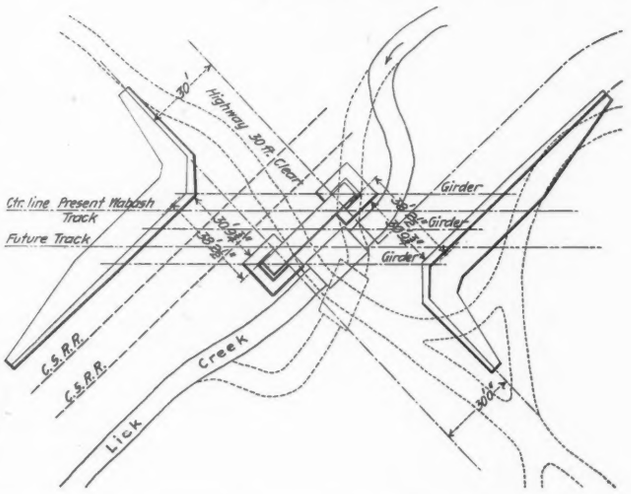
An interesting bit of overhead crossing work is being done by the Wabash at Newell, Ill., about 3½ miles east of Danville. The line of the Chicago Southern, the new road being built from Chicago to Terre Haute by the same interests that own the Southern Indiana, crosses the Wabash at this point and the latter is raising its grade in order to permit the new line to go beneath it.

From the situation plan shown herewith it will be seen that there is a highway crossing the Chicago Southern at right angles, and the Wabash occupies a skew relation to both. The original intention was to put in straight abutments and a solid pier and have the highway run around them. Work was begun on the abutments before the plans were changed to their present form, which provide for a straight highway passing through a 30-ft. opening in the pier. This accounts for the peculiarly shaped wing walls.

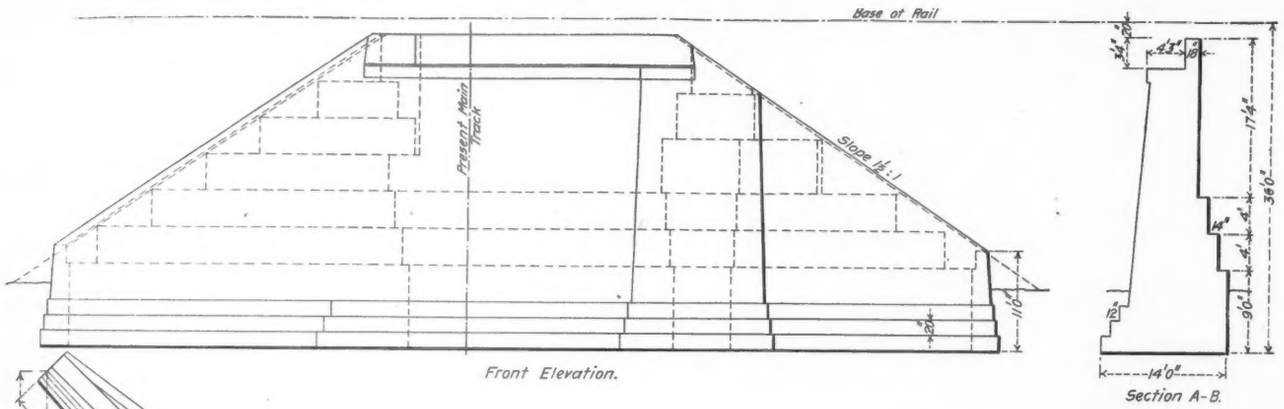
To support the track girders across the 30-ft. opening in the pier, four latticed steel girders are built into the concrete masonry, as shown by the plans. These girders are 43 ft. long by 4 ft. deep, the plans showing the details of their construction. They weigh 11,000 lbs. each and are spaced 18 in. on centers in the pier. Reinforcing rods are placed in the concrete above and below the girders as shown, the lower rods being surrounded by wire netting. The abutments are plain concrete, the details of their design being shown. The track girders are 67 ft. long and the structure is

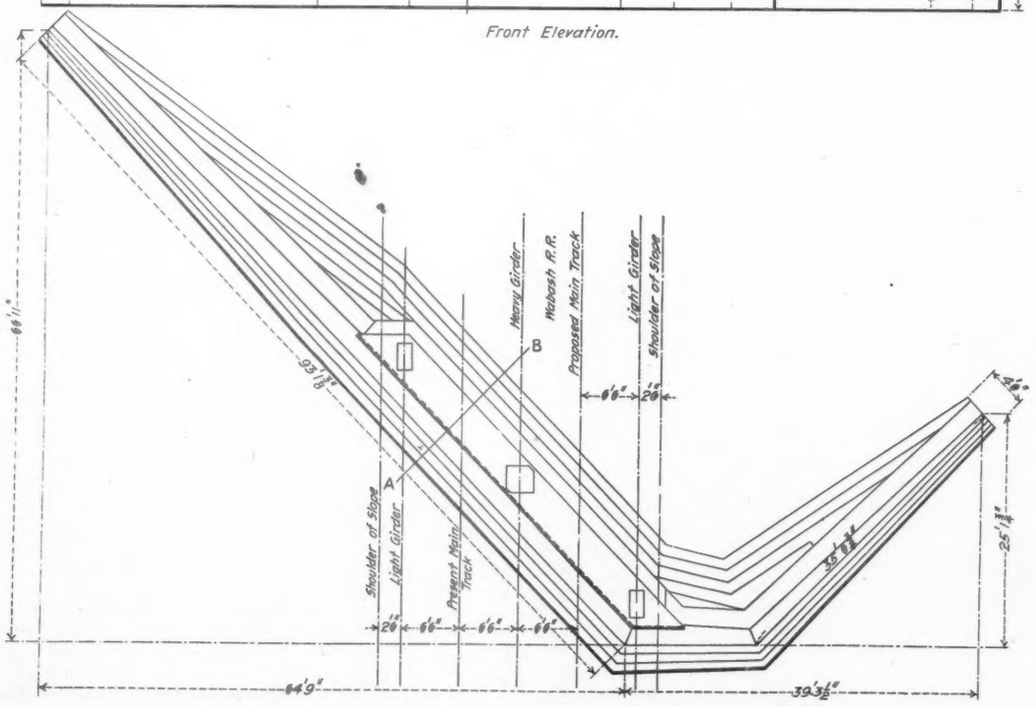


Longitudinal Section.



Plan of Grade Crossing Separation at Newell, Wabash Railroad.

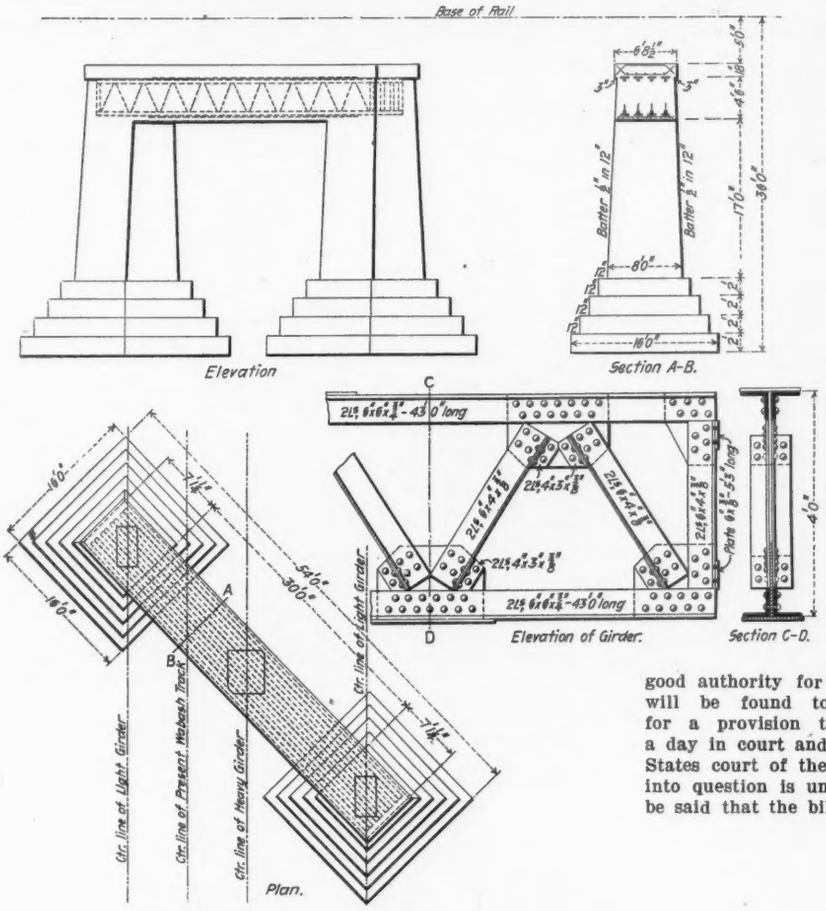




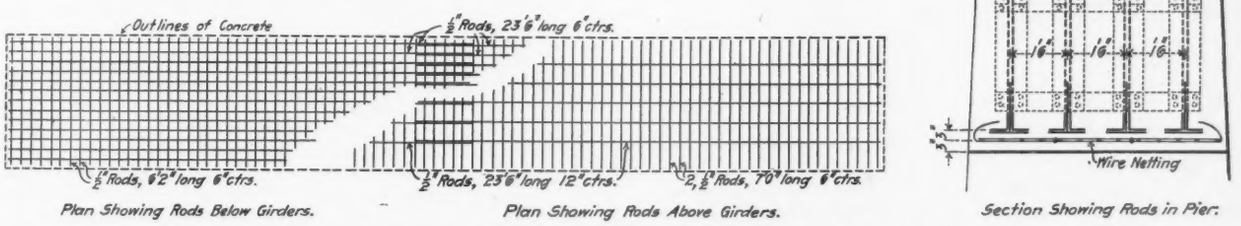
Details of Concrete Abutments for Newell Grade Crossing.

designed for double track to provide for a future second track for the Wabash.

While the head-room of the Chicago Southern is 22 ft., the actual raise in grade of the Wabash is only 10 ft., as it was on a 12-ft. fill at this point, crossing the creek and highway on a trestle. The raise of 10 ft. greatly improves the gradient of the Wabash,



Details of Center Pier and Cross Girder.


Outlines of Concrete
Rods, 23'6" long 6" ctrs.
Rods, 6'2" long 6" ctrs.
Rods, 23'6" long 12" ctrs.
2, Rods, 70" long 6" ctrs.
Rods, 7'0" long
Rods, 12" ctrs.
Wire Netting
Plan Showing Rods Below Girders.
Plan Showing Rods Above Girders.
Section Showing Rods in Pier.

Details of Reinforcement in Center Piers and Cross Girder.

which was one of the considerations prompting the change. The raise was accomplished with the assistance of a pile trestle, by filling in the ends gradually and blocking up on the trestle.

We are indebted to Mr. A. O. Cunningham, Chief Engineer of the Wabash, for the plans.

Washington Correspondence.

WASHINGTON, Jan. 2.—Representative Hepburn, of Iowa, Chairman of the House Committee on Interstate and Foreign Commerce, is putting the finishing touches on the railroad rate bill that he proposes to introduce. It is understood that this bill will follow very closely the lines of the Dolliver bill already introduced in the Senate. It will form the basis of the measure that will be reported from the House Committee and passed by the House. The House Committee is to take up the consideration of the many railroad bills that have been introduced, on January 9. It is not at present intended to have any hearings and an early report is expected. The bill reported to the House will be the Hepburn bill with few amendments of importance. Longer debate is to be permitted in the House than was the case last year when the Esch-Townsend bill was jammed through. It has not yet been decided whether the bill will be opened to amendments in the House, but, whether it is or not, it will probably be passed substantially as reported from the committee.

It is safe to predict that this House bill will not receive the approval of the Senate Committee. A majority of the Republican members of that committee take the ground that such a measure would give the Interstate Commerce Commission autocratic authority over railroad rates, and that it would be impossible for either a railroad or a shipper to obtain a judicial review of the real question at issue, that of the reasonableness or lawfulness of the challenged rate or rates. The Senate Committee will not approve the Foraker bill as it was introduced, but it is probable that any measure agreed upon by the Republican members will contain some of the features of the Foraker bill and will provide clearly that the courts shall, at some stage of the proceeding, pass squarely on the judicial question as to the reasonableness of the challenged rate.

Senator Elkins, Chairman of the Senate Committee, is working on his bill which he will bring forward as a compromise measure and which he hopes will be satisfactory to the President and the less extreme advocates of empowering the Commission to make rates as well as to the Senators and Representatives who have been unwilling to support any of the other measures thus far presented. It is understood that since Senator Elkins gave out his statement outlining what he thought ought to be the general form of a provision for changing a rate found to be unreasonable or otherwise unlawful, he has changed this feature of his bill somewhat. Just what the character of this change is he is not yet ready to announce, but there is good authority for the statement that his bill, when introduced, will be found to meet the contention of railroad officials for a provision that will insure to a carrier the right to a day in court and will provide for a determination by a United States court of the question whether a rate that has been called into question is unreasonable or otherwise unlawful. It can also be said that the bill proposes in some form to give the Interstate Commerce Commission authority to prescribe a reasonable rate to take the place of one found to be unreasonable. Senator Elkins will not say whether the judicial review of the question of whether the rate complained of was unreasonable or unlawful is to be prior to the new rate going into effect or subsequent thereto, but the action of the court is to be provided for in such way that the review will not be limited to the single question of whether the new rate is one that could lawfully be prescribed, but will cover the question of whether the old rate was unreasonable and should have been set aside.

J. C. W.

Underground Electric of London, Limited.

To succeed Charles T. Yerkes, Mr. Edgar Speyer has been elected Chairman of the Underground Electric Company of London, and Sir George Gibb, Deputy Chairman. The Underground Electric Company controls the Metropolitan, the Metropolitan District, the Great Northern, Piccadilly & Brompton and the Baker Street & Waterloo, and the Charing Cross, Euston & Hampstead subway lines, and also the London United Tramways. Sir George Gibb is well known to readers of the *Railroad Gazette* as General Manager of the North Eastern Railway.

How to Avoid Accidents.*

Next come the accidents in which patrons are injured and their property damaged. It is generally understood, and has been the custom on all railroads, that before going onto a track on which cars are placed to be loaded or unloaded by patrons or employees it is the duty of the person in charge of the crew to go along the track to ascertain if there is anyone in the cars, loading or unloading them, or wagons close enough to the cars to be injured or damaged by their movement, and, if so, to give ample warning in order that such persons, wagons, and gang planks may be moved to a safe place. In the mining district especial care should be exercised in handling cars being loaded or unloaded by the mining companies' employees, many of whom do not understand our language or the danger of the business, in order that ample opportunity be given them to get off the car before it is moved. How often that rule and custom is violated is shown by the following cases:

Ludwig Hoffmeister, injured at Montmorency, July 12; some cars were switched down against the car from which he was unloading apples, without notice to him, and he was thrown down and injured.

H. Schurmann, laborer, injured April 2 at Hennessy. He was in car 16,493 at the Winston Tile Works, piling tile in the car, when the car was struck by a car of coal dropped in on that track by 12, engine 607, knocking the tile down on Schurmann.

Claim presented by Foster & Roberts Co., for value of building at Lewiston, May 3, 1904. Engineman Henry Brinker and his fireman left engine No. 526 and went into factory to get a drink; the engine with car U. Q. & Z., 4391, ran away and knocked this building down.

A., B. & C. car 38,952, loaded with salt, was being kicked down main line by engine No. 171 at Hawkins, October 12, brakes broken, car ran in on side track and struck another car, knocking it against side of building belonging to Blumenthal & Co., breaking in the walls and damaging cooking machinery. No bumping posts.

June 8, switching crew at Kempshall backed a box car against the ammonia pipe which carries ammonia from the brewery to the bottling works of the Kempshall Brewing Company, knocking down the pipe, which was only twelve feet high, allowing the ammonia to escape.

No one will pretend that these accidents and consequent injuries and losses could not have been avoided by the exercise of a little forethought and care. Why not do it and stop them in the future and save the money they cost?

The increasing frequency of accidents to travelers crossing the tracks at highways, one-third of which the country over are fatal, is caused by the increase in number and speed of trains, increase in the population of the territory through which the road runs, by the failure to always give the required signal of the approach of the train, frequently by freight trains passing through stations at a speed prohibited by Rule No. 431, by failure to have gates or flagmen at crossings where they are needed, by failure of gatemen and flagmen, when provided, to properly perform their duties on account of ignorance or carelessness, generally the former—in the investigation of a recent accident we learned that five out of seven flagmen on that section of track could neither speak nor understand English—but chiefly .s the increase caused by failure on the part of the persons crossing the track to exercise any care whatever. Gates and flagmen are generally disregarded by adults and, as a natural consequence, by children, and the result is death and injury. This class of accidents, which in some states are nearly as hard to defend as the case of an injury to a passenger, will also explain in a measure the increase in the personal injury account. I think that as a matter of dollars and cents it would be profitable to the company to increase the number and quality of flagmen and have greater supervision given to this class of the service, as it seems to me a self-evident proposition that the lower the grade of labor the more supervision there is needed.

Among the many cases of this kind, I have selected some which will illustrate the matter. I want you to remember that the cases to which I refer in this talk are only a part of those occurring, and are selected for the purpose of calling the attention of the employees to accidents which might be avoided by the exercise of care on their part, and do not include the many cases caused by such negligence on the part of the person injured as should bar a recovery.

Herbert Janson, wife, daughter, son and George Griffith killed; Morris Peck and Henry Blume injured, December 18, at 9:00 p. m., while driving across the tracks at Haskell; caused by sleigh being struck by engine No. 245, hauling train No. 50. Engineman L. Kendrick, Fireman G. M. Lane, running forty miles an hour. Headlight not burning, as required by Rule 94. No flagman at this crossing at night. No whistling post for crossing.

H. S. Sorner, who was riding in an automobile across the tracks at Grand Ave., Morton, April 14, was struck by engine No. 320, hauling train No. 25; automobile was demolished but occupants not seriously injured. No gates or flagman at this crossing.

Jacob Reich and Elbert Harris struck and killed while driving on 13th St., Montgomery, May 29, at 5:30 p. m., by engine No. 462, hauling train No. 6. Gates up. The piano wagon on which these men were riding was demolished as well as the piano, and the horse killed. The gateman at this crossing is an Italian and very excitable.

K. L. Manson, injured, rural mail carrier, struck by switch engine No. 869, at Woodmont Ave., Custer, June 12. There are gates at this crossing, but they had not been operated for a year on account of being out of repair.

Gertrude Schiff, aged sixteen years, and Gustave Schiff, aged twenty years, were injured while driving across the tracks at first crossing east of Granton, August 9, at 6:35 p. m., by being struck by engine No. 563, hauling passenger train No. 71, G. B. Jones, engineman, Sam Silverton, fireman. No whistle was blown for the station and bell not rung. The station employee, whose duty it was to be on the crossing to flag same when trains were passing, had left there only an instant before the accident in order to go to the station house to assist in loading and unloading baggage for train No. 71.

H. L. Connors, driving across the tracks near Lowell, November 18, was struck by engine No. 382, hauling train No. 4. No whistle sounded or bell rung for the crossing. The whistling post is not in the right place.

M. A. Graves, while crossing the tracks at 9th Avenue and Wilbert street, Ontario, May 8, was struck by switch engine No. 105, Engineman G. Allwood, Fireman A. M. Branton. No one on the engine knew that the accident had occurred.

Edward Langdon struck and killed by engine 619, hauling extra freight, at 7:21 p. m., August 6, at Water and Orchard streets, Berlin; James Olds, engineman. No one on the engine knew that an accident had occurred; train traveling twenty to twenty-five miles an hour. Ordinance provides speed limit of twelve miles an hour; gates at this crossing, but not in operation. If Rule 338 had been complied with this accident would not have occurred.

Wagon belonging to the Empire Novelty Company struck at Calkins at 9:37 a. m., October 29, by train No. 13, engine No. 932, Engineman Henry Robbins; wagon and contents badly damaged. Flagman at this crossing claims to have been sick at the time of the accident, and was in his shanty sitting down. He could not speak or understand English. Michael Powell, driver, injured.

Many of these crossing accidents occur and no one on the engine knows that they happen. Whether it is because the men on the engine are not keeping a proper lookout or by reason of the recent manner of construction of the large engines, making it impossible for the men in charge to always see a man on the track, I do not know, but I notice that some of the Class G-9 engines have the air cylinder and pump on top of the running board. While riding on a train the other day I asked one of our old runners whether they obstructed the view. His answer was an object lesson. He took his hat and placed it in front of the window opposite which I was riding and asked me if that obstructed my view. The cylinder could, I think, be put on the tank and the pump below the running board, which is now made wide enough to hold a political meeting on. Formerly they were narrow, just wide enough for a man to walk on, the old theory of construction being, as I understand it, that there should be nothing protruding from the sides of the boiler which would prevent the man in the cab seeing the bunting beam. If it were practicable to so construct the running boards and place air cylinders, pumps, etc., so that this could now be done, the engineman would certainly have a much better chance to see, and possibly some of these accidents be avoided.

And while our patrons and the public insist upon our running trains at a high rate of speed and guarding the crossings with gates, flagmen, or warning bells, they, at the same time, for some inexplicable as well as unconscionable reason, attempt to hold us liable for all deaths and injuries, no matter how great the care and foresight we have exercised, or how gross the neglect of the injured party. It therefore behooves us to do everything possible to prevent such accidents, not only that we may thereby save life, but also money.

If gatemen and flagmen were uniformed and given authority to arrest persons crossing the track when gates are down, or trains approaching, the number of cases of this kind would be largely reduced.

When there is a penalty provided and enforced against people attempting to cross a railroad track when the gates are down or they are warned by a flagman, accidents at crossing will be greatly reduced. As it is now, the public compels the erection of the gates and then almost universally disregards their warning.

Before leaving this subject of accidents at highway crossings I want to call attention to Rule 47, which says that when cars are being pushed by an engine (except when shifting or making up trains in yards) a flagman must be on the leading car, and Rule 47A requires that when cars are being switched over highway or street railway crossings a man must be stationed on the ground to act as flagman. Too much importance cannot be placed upon the observance of these rules, not occasionally, but always. If you will comply with them in the future fewer people will be injured. Try it and see.

In municipalities, run as slowly and carefully as you can and see that the bell is always ringing. Rule 406. Freight trains in going through stations should reduce their speed and do so under control as per Rule 338. The fireman, as well as the engineman, should be on his seat at that time keeping a lookout, and not engaged in waving a signal to some one on another train or elsewhere, or putting in a fire, and you enginemen should see that he does this. On the double track when you are going to meet another train at a crossing, try to get your engine over the highway before the tail end of the other train gets by it. If you can't do that, slow up a little, so as to give the people who may be waiting a chance to see you, and, if you think there is danger, open your whistle to let them know that you are coming; that is what the whistle is for.

* From a paper prepared by the Claim Department of the A., B. & C. Railroad, part of which appeared in the *Railroad Gazette* of December 15, under the heading "Injuries to Passengers."

In the country be sure to sound the whistle; not once, but four times as required by Rules 99 and 100, and see that the bell is kept ringing until the crossing is passed, at dangerous and obscure crossings where you can neither see the travelers approaching nor they you; if you are running at a nigh rate of speed, sound the whistle before you get to the post, as well as at it. The law requiring the giving of this warning eighty rods from the highway was enacted when few trains exceeded twenty-five miles an hour. Now, when few trains make less than forty ,and many over seventy, in the open country, so little time elapses between the sounding of the whistle and the reaching of the highway that when possible more timely notice should be given.

And I want to say here that one of the difficulties we meet with in this class of cases is the fact that sometimes you do fail to blow the whistle and ring the bell, and as long as men are human I suppose such things will happen; but let us commence now and try to do it every time. The greater the storm of rain, snow, or wind, the denser the fog, or the darker the night, the more important it is to give the warning.

If there is any way to discover whether the engineman and trainmen are observing the signals, which are located along the track for the protection of the passengers, other employees, themselves, and the property in their care, other than by having inspectors observe their action on approaching signals, and ascertain if they give the required warning of their approach to highway crossings, etc., and you will advise the management what it is, I am sure they will be glad to adopt such a plan. It has always been customary to have auditors examine the accounts of officers and agents handling money to see that not only are their accounts correct, that the money collected is remitted, but also to ascertain if the business of the company is done in accordance with the rules and a correct record kept of the transactions. No one for an instant thinks that the fact that the officers' and agents' accounts are examined is any discredit to them; most of us are not only willing but anxious that it should be done, as it is a protection to us as well as to the company. And if it is necessary to check up the officers and agents who handle money, is it not much more necessary to check up men who handle human beings and property of immense value, to see that they observe signals and rules before, instead of after, an accident?

And as it sometimes happens that an engineman will not notice that his headlight has gone out, especially when there is snow on the ground, any employee who sees an engine moving after dark without the headlight burning should stop it and tell the engineman; if you can't do it yourself call up the train despatcher, so he can do it at the next station.

Occasionally we have an accident in which trespassers are killed or injured while walking or playing on the tracks, which might be avoided by greater care and watchfulness to discover their danger, by warning them of your approach, either by continuous sounding of the whistle, by slowing up, or by stopping when you have reason to think they do not know a train is coming, especially on the double track when trains are moving on both tracks. The most heartrending of them all are injuries to children, and, sometimes, to women.

Let me cite you several of just such cases:

Albert Jennings, ten years old, was sitting on the tracks north of Lampton, July 9, at 10:45 a. m., when he was struck by a work train of twenty-two empty flats backing north; engine No. 634, Conductor H. B. Welles. Air not coupled in as required by Rule 1036; no hand brakes on the cars. Welles was on the rear car and claims he was keeping a lookout, and although he had a clear view for over a quarter of a mile he says he did not see the boy until he was within three or four car lengths of him.

Charles West, aged eighteen months, struck and killed 1,000 feet south of Savannah Station, June 16, by train No. 31. Child came on track through a break in the right of way fence.

Margaret Kennedy, struck and killed on June 13, at 6:10 p. m., while walking on the tracks inside the city limits of Utopia, by engine No. 396, hauling passenger train No. 48, Engineman J. H. Simpson, Fireman Robert Cross, running about twenty-five miles an hour; although the engineman saw her in time to have stopped, he did not realize that she did not see or hear the train coming, and failed to do so.

Mrs. Helen Boston, eighty-four years old, struck and killed on a bridge near Lenox, September 1, at 4:35 p. m., by engine No. 684, hauling passenger train No. 15; Engineman I. W. Landis; Fireman B. M. Lent. Track is straight for about two miles and a half east of place of accident, and the woman wore a bright pink dress skirt. No one on the engine knew the accident had happened.

December 21, engine 746, Engineman Allen Woods, ran over G. P. Krauss, at 5:40 p. m., a quarter of a mile south of Slazenger. Engineman says he saw something lying on the track and thought it was a bough of evergreen. He did not know until he reached the station that anybody had been struck.

As the traffic and population increase, cases of this kind grow in number, and, for some unknown reason, the public think that, while they must keep off the property of private individuals, where there is no danger, they are privileged to go onto a railroad track where everyone knows there is great danger, and that after doing so a few times, the courts may say that they have a license to do so, and that we must look out for them and see that they don't get hurt. On the same theory I suppose the courts would say after a man burglarizes your house six or seven times that he has a license to try it again, and if he gets hurt doing it because too much force was used in throwing him out, that you must respond in damages. So when you discover that people, old or young, are making a custom of walking through the yards or on the track, report it to your superintendent before, not after, someone is killed or injured, and he will try to stop it. And if you find a child or a drunken man on the track, drive him off, because if you don't he is likely to get killed; and the company will not only back you up in doing so, but thank you for your thoughtfulness.

Rule 691 says that cars must be placed so as not to project over highway crossings, and yet any one riding over the system will see any number of them so left, and the result is that about once in so often a wagon strikes a car in an attempt to get across, a horse is frightened, and a runaway results, someone is hurt, and money paid to settle the claim.

The last serious case of this kind occurred at Warburton, July 9, in which Mrs. Jansen was fatally injured, caused by her horse being frightened by a freight car which was left standing fifteen feet in the highway, the end of the car being on the crossing plank. Horse ran away and she was thrown out.

When cars are left in such position they not only frighten horses and cause accidents similar to the one last mentioned, but also obstruct the view of approaching trains. Both the law and rules of the company prohibit this, and the practice should be stopped.

And right here I want to call attention to Rule 723, which prohibits engines standing within 100 ft. of a highway crossing, under a bridge, or near cars occupied by passengers, when it can be avoided, and yet the rule is so often disregarded that one wonders whether any one knows of its existence. Especially is this so with engines hauling passenger trains stopping at stations and occupying half of the highway, when they could just as conveniently be back some distance from it.

The stoppage of trains with the rear car standing in the highway should also be avoided so far as possible, particularly in the winter time, when there is always more or less steam leaking from the hose, as it is likely to frighten horses waiting to get by or in crossing the track.

Rule 571 says that trains must not block highway crossings more than five minutes. The failure to observe this rule is the cause of as much, if not more, criticism and profanity on the part of our patrons and the public than almost any other one thing that train and switchmen do. No one but the person who is waiting to get across the track, and sometimes it is a doctor answering an emergency call—we had such a case a few days ago—can realize how tantalizing and annoying it is, so for goodness' sake observe the rule in the future.

Turntables should be locked (that is what Rule 263 says), and yet I rarely, if ever, go over the line but what I see one unlocked. The result is that children are attracted to the place, and sooner or later one of the little ones gets hurt, as did the following, which are cited as examples:

Anthony Young, a ten-year-old boy, had his foot caught at Grandison, March 30, while playing on turntable which was unlocked.

Phillip Chartres, eight years old, injured at Alvin, August 14, 2:30 p. m., while playing on turntable, which is about 1,400 feet north of roundhouse, used by Bridge Department to turn wrecker on. Turntable was not locked.

Now, it wouldn't take but an instant to lock the turntable. Why not do it and prevent some child, perhaps your own, from going through life a cripple?

Be careful not to leave any torpedoes around that are not attached to the rail, as required by Rule 33, and never put them on a rail in a highway; if you do children may pick them up and in examining them get injured. We have had several such cases.

John Newton, aged nine years, injured June 30, about two miles north of Walker. This little boy with his sister and another boy were returning from school, walking along the track. They picked up a torpedo lying alongside the track, and after trying to open it with a knife young Newton placed the torpedo on the rail and struck it with a stone, the torpedo exploding and pieces of the tin striking him in the eyes and face, badly injuring him.

One of the great risks that every railroad that uses soft coal for fuel runs is the risk of fire to adjacent property started by sparks or ashes from engines. Any man running an engine ought to know from the sparks thrown out and fires started whether the engine is in good or bad order. Rule 946 says that the enginemen must report defects in netting and ash pans; this is required so that if the inspector overlooks the defect, or if one occurs between the regular inspections, it will be remedied before any damage is done, and if an engine is throwing more fire than she ought to, it is up to you to report it and get it fixed. It will take you less time than to make a report about the fire and condition of the engine, and, at the same time, save both the owner of the property and the company a loss. In lumber and sawmill country it is especially important that this be done, and where engines are working in or around sawmills, lumber yards, powder and tie plants, and other places where danger of fire is great, the apparatus for preventing the escape of fire should be absolutely perfect, and it ought to be the personal business of the engineman to know that fact; he should be present when the inspection is made, and see that it is

done thoroughly, the same as he would if he and not the company had to foot the bill if the engine started a fire.

On the outlying division, where traffic is light and trains are few, if your engine starts a fire, stop and put it out. If conditions are such that you can't do that with safety, drop a note off to the first section crew or agent, so that they can send men out to extinguish the fire. If you don't, the Lord only knows where it may run to (on the western prairies I have known it to go twenty-five miles) or how much damage it will do in lumber country.

If the precautions suggested here, which are neither new nor original, but can be found in the book of rules and on the bulletin boards, had been adopted, none of the following cases would have occurred.

June 3, engine No. 2041 started a fire at Hansel & Woods Company's plant at Myron Valley; netting on this engine was in bad order; the hood provided by the company to be placed over the smokestacks of engines going into the plant of this company also in bad condition.

Claim presented by Gilbert Purcell for value of a house and contents burned April 20, one-half mile south of Fort Andrew, started by engine No. 1759. This engine was inspected and reported to be in good condition, but upon examination by my assistant was found to be defective.

On August 17, engine No. 539, hauling train No. 81, Shirley division, set out three fires between Selkirk and Belmont. Fires were observed by train crew, but train was not stopped, and no effort was made by crew to extinguish the fires. Fires burned over 15,000 acres of ground, destroyed about 1,100 tons of hay in stack, one building, a large acreage of winter feed, fence posts, etc.

Experimental Locomotives for the Pennsylvania Railroad.

In following out its practice of keeping posted in regard to current development the Pennsylvania Railroad has ordered five locomotives for experimental and observation purposes to follow the work done upon the testing plant which formed a part of the company's exhibit at St. Louis. The order consists of two each of four types of American locomotives and two of a foreign build. The American engines include a four-cylinder balanced compound of the Atlantic type built by the Baldwin Locomotive Works, from its own designs; a four-cylinder balanced compound of the same type built by the American Locomotive Co. from its own designs; a consolidation locomotive built by the American Locomotive Co. from its own designs; a prairie type locomotive built by the same company from its own designs, and a four-cylinder balanced De Glehn compound, built by the Société Alsacienne de Construction Mecanique, of Belfort, France.

As stated, two of each of these engines have been ordered, one to be worked on the lines east of Pittsburg and one on the lines west. It is not claimed that they embody any distinctive novelties, for many of each type have been built for other roads and have been in service for some time. They were merely ordered that their performances might be observed and compared with those of engines of a similar class designed at Altoona.

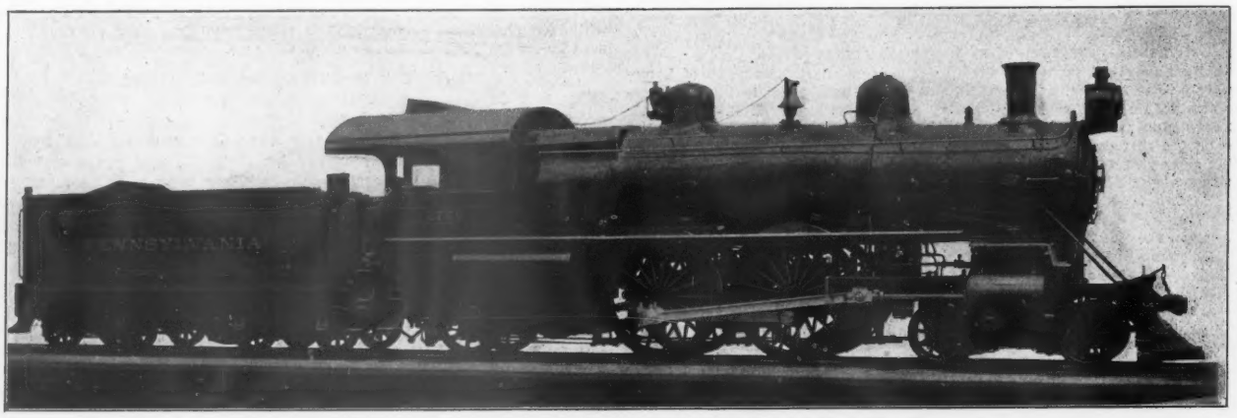
Of the five types of engines ordered three are of the four-cylinder compound class, and of these the two of the Atlantic type were designed by the Baldwin Locomotive Works and American Locomotive Co. respectively. The two engines are very similar to each other in general appearance, though with the differences incidental to the fact that they were independently planned. Each has the low-pressure cylinders upon the outside, driving the rear pair of wheels upon whose axle the eccentrics are placed, and moving the piston valves set above and between the two cylinders on either side. A single valve operates the high and low-pressure cylinders on each side. The most noticeable difference in the external appearance of the two is to be found in the arrangement of the equalization between the drivers and the trailing truck. In the engine from the Baldwin Locomotive Works there is a single bar with unequal arms spanning the distance between the springs of the rear driving wheel and the equalizer over the oil box. The American Locomotive Co. on the other hand uses a series of three short equalizers to cover this same distance. Both engines conform in general to the standard practice of the Pennsylvania in the use of certain parts, such as the Belpaire boiler, the Vogt protected single-bar guide and other features.

The principal dimensions of the two are as follows, and from these a detailed comparison can be made.

	American Locomotive Co.	Baldwin Locomotive Works.
Cylinder diameter, h. p.	16 in.	16 in.
Cylinder diameter, l. p.	27 "	27 "
Piston stroke	26 "	26 "
Wheel base, driving	7 ft. 5 in.	7 ft. 5 in.
" " total	31 " 11 "	33 " 8 "
" " engine and tender	61 " 4 "	63 " 1 1-16
Weight in working order	200,500 lbs.	195,000 lbs.
" on drivers	117,200 "	120,500 "
" front truck	..... "	42,400 "
" trailing truck	..... "	33,000 "
" engine and tender	325,800 "	328,000 "
Heating surface, tubes	2,680.17 sq. ft.	2,698.0 sq. ft.
" " firebox	181.40 "	166.0 "
" " total	2,861.57 "	2,864.0 "
Grate area	35.0 "	55.5 "
Axles, diameter, driving journal front	10½ in.	10 in.
" length, driving journal front	12 "	11 "
" diameter, driving journal back	10½ "	9½ "
" length, driving journal back	12 "	13 "
" diameter, truck, journals	6½ "	5½ "
" length, truck journals	12 "	10 "
" diameter, trailing journal	7 "	7 "
" length, trailing journal	11¾ "	11¾ "
" diameter, tender journals	5½ "	5½ "
" length, tender journal	10 "	10 "
Boiler, outside diameter, first ring	67 "	67 "
" working pressure	205 lbs.	205 lbs.
" fuel	Bituminous coal.	Bituminous coal.
" thickness of sheets	11-16 in.	11-16 in.
Firebox, type	Belpaire.	Belpaire.
" length	111 in.	111 in.
" width	72 "	72 "
" depth front	73 13-16"	67 1-16"
" depth back	66 1-16"	64 1-16"
" thickness crown sheet	⅜ "	⅜ "
" thickness tube sheet	½ "	⅝ "
" thickness sides and back	5-16 "	5-16 "
" water space front and sides	4 "	4 "
" water space back	3½ "	3½ "
" crown staying	Radial.	.....
Tubes, number	315	261
" diameter	2 in.	2¼ in.
" length	16 ft. 4 in.	17 ft. 8 in.
Nozzles	Single.	.....
Piston rod diameter	3 in.	.....
Tank, type	Water bottom.	.....
" capacity, water	5,500 gals.	5,500 gals.
" capacity, coal	20,000 lbs.	25,000 lbs.
Valves, type	Piston.	Piston.
" travel	6 in.	.....
" lap	1 "	.....
" extra clearance, h. p.	5-16"	.....
" extra clearance, l. p.	⅜ "	.....
" lead	¼ "	.....
Wheels, driving, diameter	80 "	80 "
" truck, diameter	36 "	36 "
" trailing, diameter	50 "	50 "
" tender, diameter	36 "	36 "
Tractive power	23,300 lbs.	23,300 lbs.

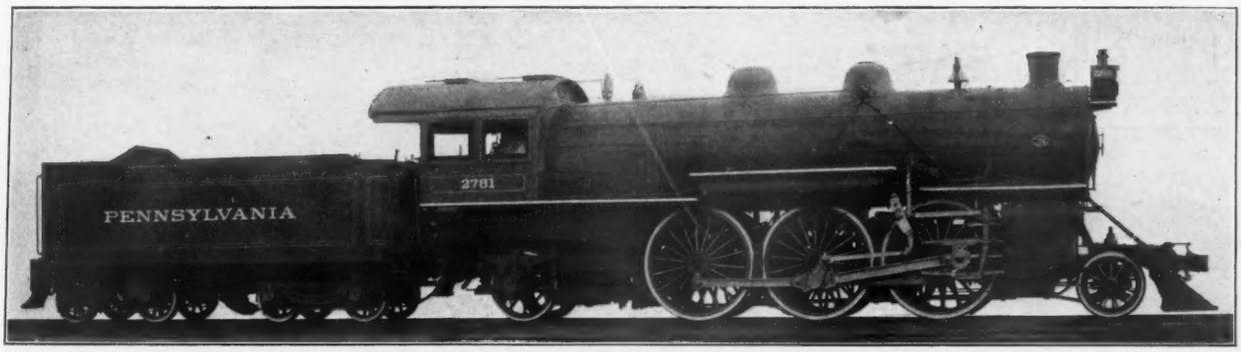
Cast-steel is used for the axle boxes throughout and also for the driving wheel centers. The engines are equipped with the Westinghouse-American high-speed brake with shoes applied to all wheels. The high-speed brake is also used on the tender. A 9½-in. air pump is used. The exhaust nozzles are single and vary from 5⅝ in. to 5⅞ in. in diameter. The lead which is indicated for the engine of the American Locomotive Co. is set for ¼ in. opening when in the forward motion and cutting off at 11 in.

A comparison of the figures in the schedule show some difference of practice with two builders that are of interest. It is understood, of course, that the two engines were intended to be practically the same, and yet at the very outset there is a difference of 5,500 lbs. in the weight. Curious enough, it is the lighter engine

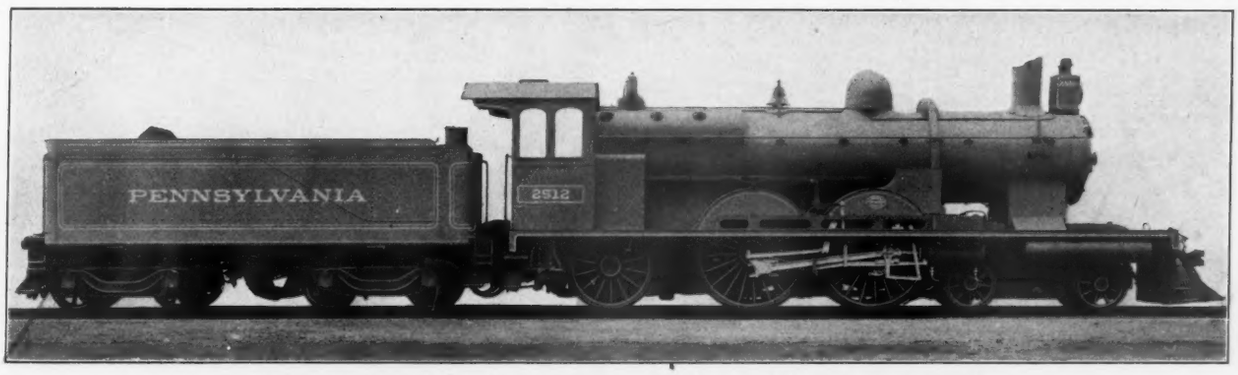


Four-Cylinder Balanced Compound Atlantic (4-4-2) Type Locomotive.

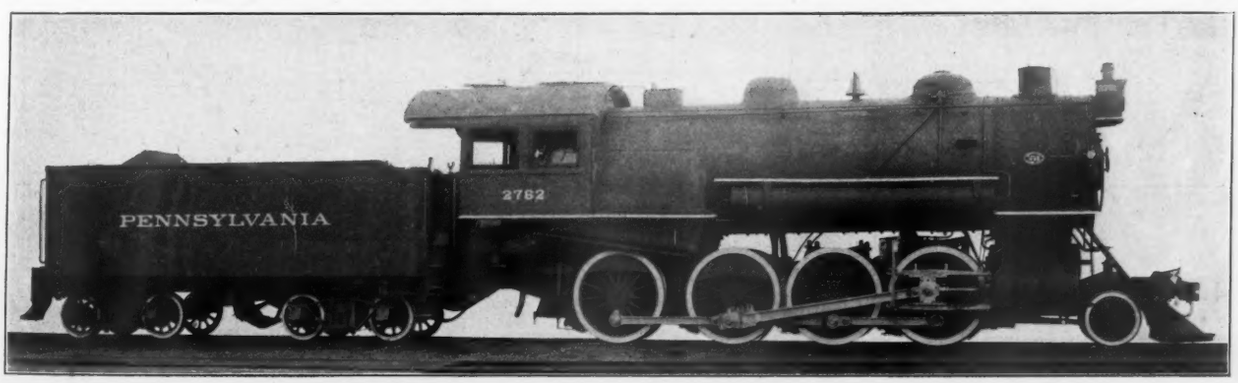
Built by The Baldwin Locomotive Works.



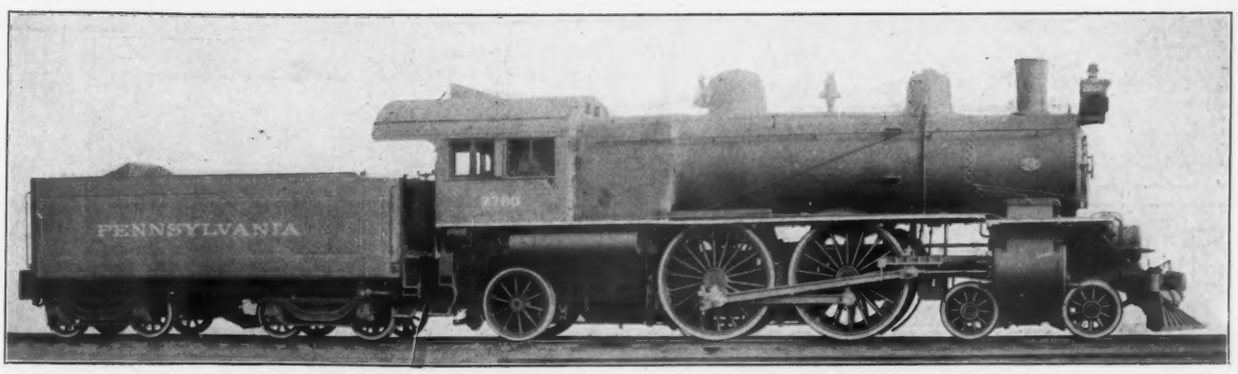
Prairie (2-6-2) Type Simple Locomotive.
Built by The American Locomotive Co.



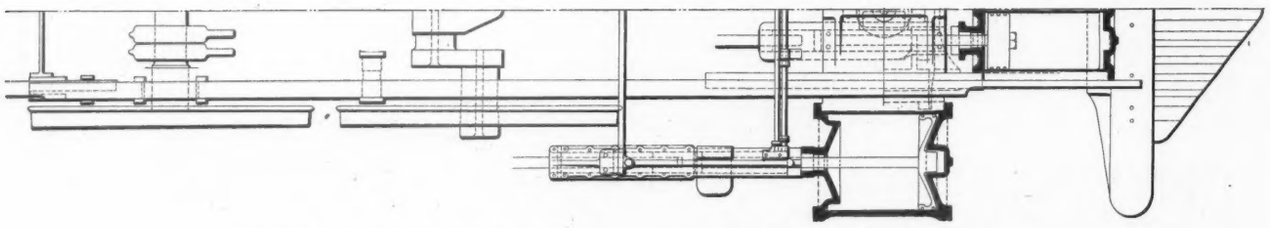
De Glehn Four-Cylinder Balanced Compound Atlantic (4-4-2) Type Locomotive.
Built by The Societe Alsacienne de Constructions Mecaniques, Belfort, France.



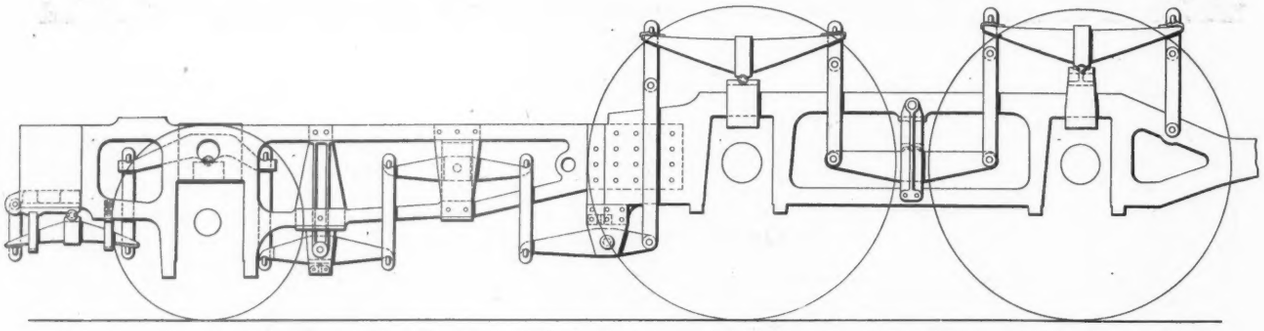
Consolidation Locômotive with Walschaert Valve Gear.
Built by The American Locomotive Co.



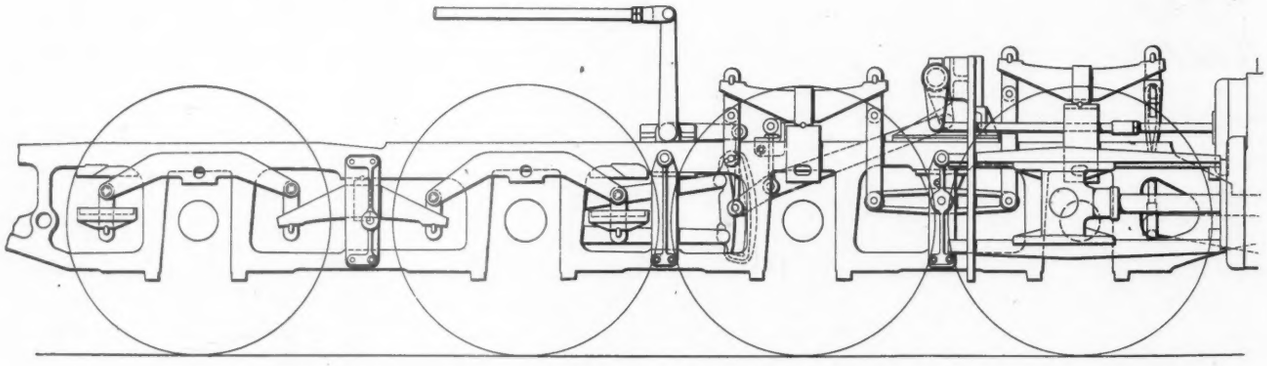
Four-Cylinder Balanced Compound Atlantic (4-4-2) Type Locomotive.
Built by The American Locomotive Co.



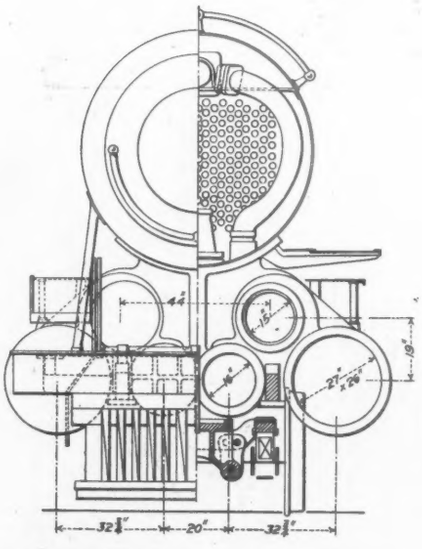
Half Plan of Cole Four-Cylinder Compound Atlantic (4-4-2) Type Locomotive.



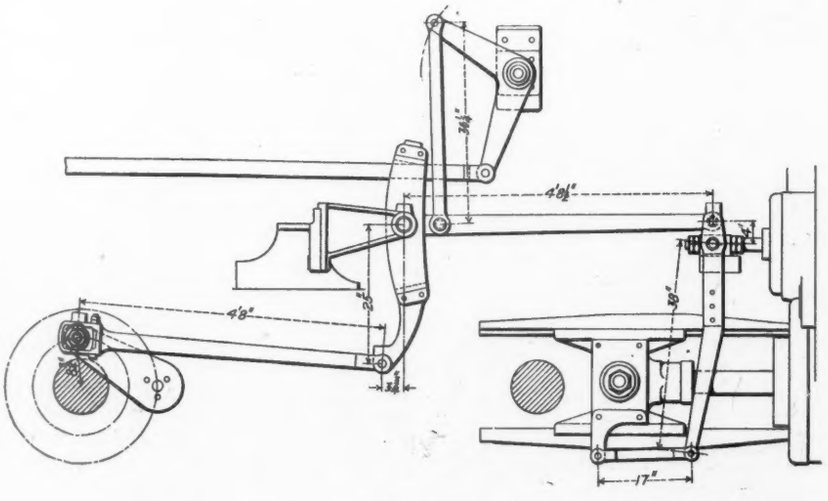
Spring Suspension of Cole Four-Cylinder Balanced Compound Atlantic Type Locomotive.



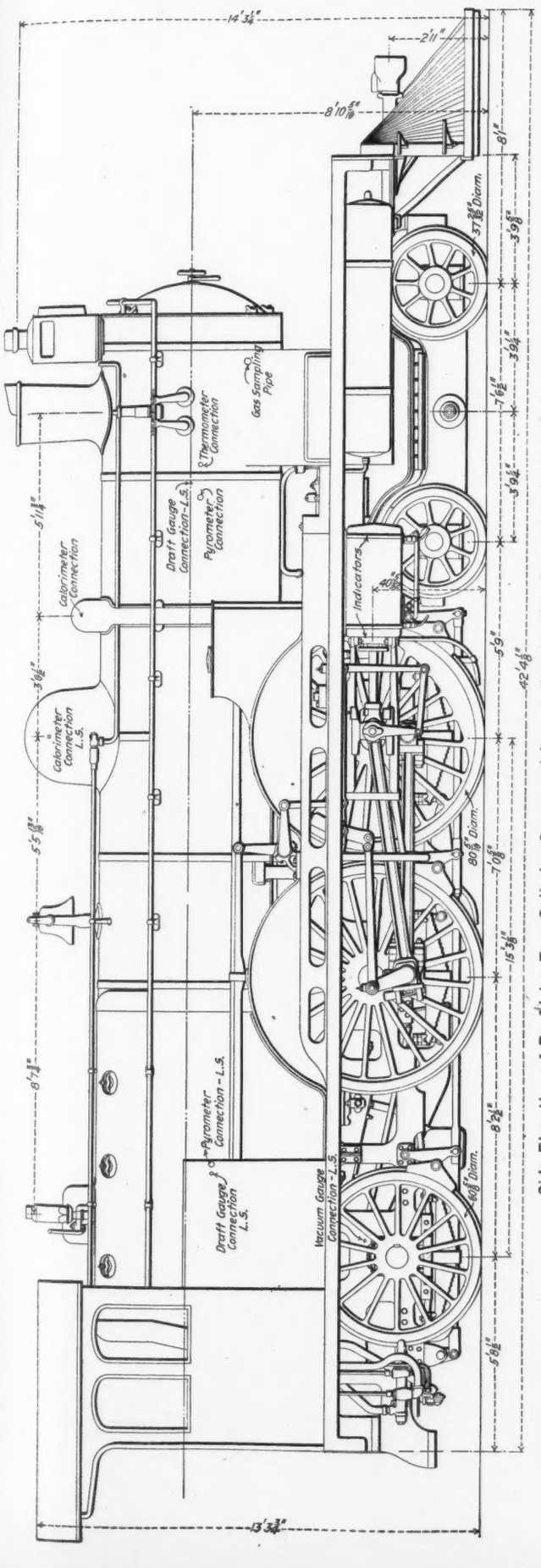
Spring Suspension and Valve Motion of Consolidation Locomotive.



Cross-Section of Baldwin Four-Cylinder Compound Atlantic Type Locomotive.



Walschaert Valve Gear for Prairie Type Locomotive.



Side Elevation of De Glehn Four-Cylinder Compound Locomotive for the Pennsylvania Railroad.

Built by The Societe Alsacienne de Constructions Mecaniques, Belfort, France.

that has the greater weight on the driving wheels. Again, in the matter of heating surface, which is practically the same in the two, there is a marked difference in the way in which it is obtained. In one there are 315 2 in. tubes each 16 ft. 4 in. long. In the other the tubes are 2¼ in. in diameter, 17 ft. 8 in. long and only 261 in number. It will be interesting to note the relative fuel consumption on the two engines when they are placed in the testing plant and worked under identical conditions of drawbar pull and quality of fuel some inkling of the relative value of a long and large tube as compared with a small and short one should be obtained, though it cannot be expected to finally settle the question as to the relative merits of a large number of short tubes as compared with a smaller number of long ones of the same diameter. In other respects the engines are so nearly alike that the relative importance of the differences noted should be brought out in a striking manner, for it is not probable that the slight difference in the depth of the firebox at the front and back will make any appreciable difference in the fuel consumption or the work that the engines are capable of doing on the road.

The consolidation locomotive built by the American Locomotive Co. is a massive machine of over 220,000 lbs., of which 198,000 lbs. are upon the driving wheels, or 24,750 lbs. upon each wheel. The cylinders are 23 in. in diameter, with a piston stroke of 32 in. or the same, lacking 1 in. in diameter, as the engine built a number of years ago by the Pittsburg Locomotive Works for the Pittsburg, Bessemer & Lake Erie, which was heralded, at the time, as the largest locomotive in the world. The boiler has an outside diameter of shell of 83¼ in., using plates $^{13}/_{16}$ in. thick. It is of the straight-top radial stay type.

The equalization of the engine is arranged to take the two rear drivers and the two front ones with the pony truck. This will be recognized as a modification of the standard arrangement of a few years ago, when the equalization was between the three rear pair of wheels, and the front pair of drivers and the pony truck.

Piston valves are of course used, and a marked feature of the valve mechanism is the inclined connection between the link block and the rocker arm. This connection is carried, near its lower end, by a swinging link 14 in. long that hangs vertically when in its central position. The rocker arms are 10½ in. long, and the driven one stands at right angles to a line drawn from its swing center to the lower end of the link referred to. For an equal amount of motion on either side of its central position, this gives an unequal travel to the valve.

The slip of the link block is also in opposite directions, being down when ahead of the central position and up when back of the same. The result of this is that there is a greater travel to the block back of the center than forward, which tends to compensate for the inequality set up by the angularity of the connection bar, and thus equalize the valve travel and tend to keep the working of the engine square.

In the equalization of the two rear pair of driving wheels, bars are used over the top of the driving boxes, a single semi-elliptic spring between them and two helical springs beyond the boxes at the end of the equalization system. This method of spring suspension is not rare, but the comment to be made upon it is that the use of the helical spring tends to neutralize the sluggishness of the semi-elliptic spring, and to give the engine the motion that it would have if it were carried on the helical spring only. It has been found that when a helical and elliptic spring of about the same capacity are used in parallel to support a given weight, the trace of the motion of that weight is more rapid and prolonged than it would be if it rested on the elliptic alone, and yet not as rapid or as prolonged as if it were on the helical alone. In short it is a true resultant of the two. For this reason the use of an excess of helical spring support draws the resultant action towards that of the helical alone, which is an undesirable condition in the spring suspension of either a locomotive or a car.

The principal dimensions of this engine are as follows:

Cylinder, diameter	23 in.
Piston stroke	32 "
Tractive power	45,700 lbs.
Wheel base, driving	17 ft. 6 in.
" " total	26 " 5 "
" " engine and tender	60 " ½ "
Weight in working order	220,000 lbs.
" on drivers	198,000 "
" engine and tender	360,500 "
Heating surface, tubes	3,596.5 sq. ft.
" " firebox	177.1 "
" " total	3,773.6 "
Grate area	55.4 "
Axles, diameter, main driving journal	10 in.
" length, main driving journal	12 "
" diameter, trailing, journal	9½ "
" length, trailing journal	12 "
" diameter truck journal	6 "
" length truck journal	10 "
" diameter, tender journal	5½ "
" length, tender journal	10 "
Boiler, type	Straight top.
" diameter outside first ring	81⅝ in.
" working pressure	200 lbs.
" fuel	Bituminous coal.
Firebox, type	Wide.
" length	108 1-16 in.
" width	75¼ "

Firebox, thickness crown, side and back sheets	5/16-in.
" thickness tube sheet	9-16-in.
" water space	4½ "
" crown staying	Radial.
Tubes number 446; diameter	2 in.
Tubes, length	15 ft. 6 in.
Piston rod, diameter	4 in.
Smokestack, diameter	20 "
Smokestack, above rail	14 ft. 9¾ "
Tank, style	Water bottom.
" capacity water	7,000 gals.
" capacity coal	13 tons.
Valves, type	Piston.
" diameter	14 in.
" travel	6 "
" lap	⅞ "
" lead	0 "
Wheels, diameter, driving	63 "
" diameter, truck	33 "
" diameter tender	33 "

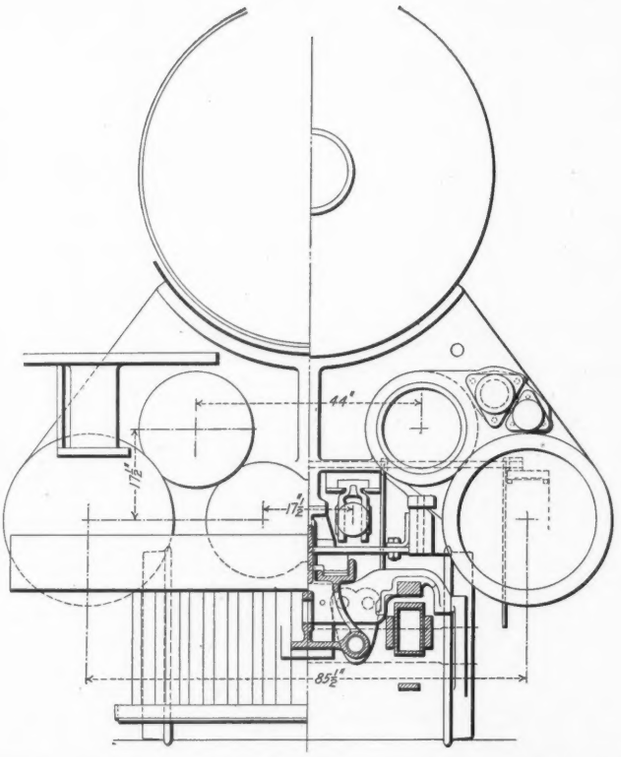
The engine is equipped with the Westinghouse-American air-brake, with a 9½ in. pump and two reservoirs of a total capacity of 83,865 cu. in.

The Prairie, or 2-6-2 type of engine, built by the American Locomotive Co., has the same form of straight top boiler as the consolidation with double fire-door and the crown held by radial stays. In this engine the most noticeable feature is the Walschaert valve gear, the details of the general arrangements or which are shown in the illustration. The equalization of this engine is divided between the rear drivers and trailing truck and the two front drivers with the front truck. Piston valves are also used on this engine. Its principal dimensions are:

Cylinder, diameter	21½ in.
Piston stroke	28 "
Tractive power	27,520 lbs.
Wheel base, driving	14 ft.
" " total	34 ft. 3 in.
" " engine and tender	64 " 6¾ "
Weight, in working order	234,500 lbs.
" on drivers	166,800 "
" engine and tender	373,800 "
Heating surface, tubes	3,678.9 sq. ft.
" " firebox	202.7 "
" " total	3,881.6 "
Grate area	55.0 "
Axle diameter, driving journals	10 in.
" length, driving journals	12 "
" diameter, truck journals	6½ "
" length, truck journals	12 "
" diameter, trailing journals	8 "
" length, trailing journals	14 "
Boiler, type	Straight top.
" outside diameter, first ring	74½ in.
" working pressure	200 lbs.
" fuel	Bituminous coal.
Firebox, type	Wide.
" length	108⅛ in.
" width	73¼ "
" thickness crown, side and back sheets	5/16 "
" thickness tube sheets	½ "
" water space front and sides	4½ "
" water space, back	4 "
" crown staying	Radial.
Tubes, diameter	2¼ in.
" length	19 ft. 6 in.
" number	322
Piston rod diameter	4 in.
Smokestack, diameter	18 in. and 21¾ in.
Smokestack, above rail	14 ft. 10⅜ "
Tank style	Water bottom.
" capacity, water	7,000 gals.
" capacity, fuel	10 tons.
Valves, type	Piston.
" diameter	12 in.
" travel	5½ "
" lap	1¼ "
" exhaust clearance	1/16 "
" lead	7-32 "
Wheels diameter, drivers	80 "
" diameter, front truck	42½ "
" diameter trailing	50 "
" diameter, tender	36 "

Like the other engines of this lot, the Westinghouse-American air-brake is used, with the usual attachments. In the packing of the pistons the Dunbar rings have been used instead of the cast-iron rings of the others. The exhaust nozzles are also made variable in this case, with a range of from 5½ to 5¾ in. in diameter. All of the tenders have steel underframing made up of 8 in. and 10 in. channels.

The De Glehn four-cylinder compound is the last on the list of these experimental engines and is in marked contrast, in general appearance, to those which have been built in the United States.



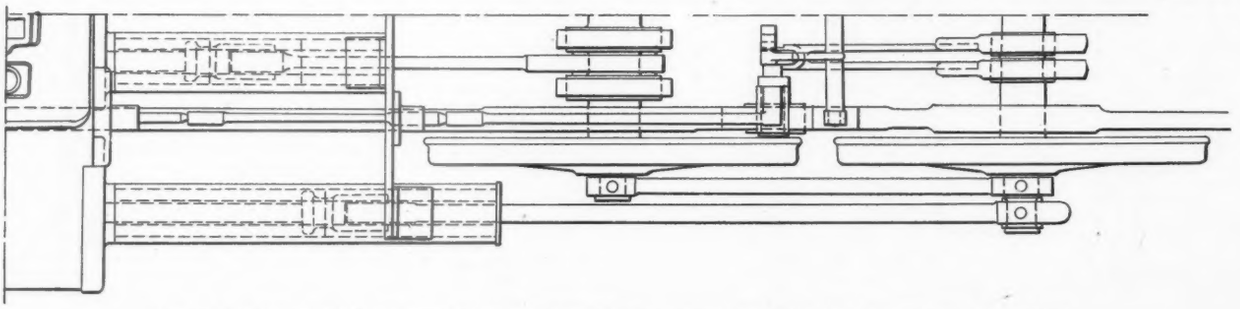
Cross Section of Cole Four-Cylinder Balanced Compound Atlantic (4-4-2) Type Locomotive.

The smoothness of the outline, the concealing and apparent inaccessibility of the working parts, the lack of equalization between the weights on the several wheels, the heavy plate frame of the truck, the smoke-stack deflector and the outside steam pipes all mark it as of non-American origin.

In the engraving, the points at which the various pieces of apparatus intended for use in the testing of the machine are to be applied are shown, and will be of interest as indicating not only how the work is to be done but the thoroughness with which it is to be prosecuted.

The engine is of the Atlantic type with a rather large trailing wheel. The arrangement of cylinders upon this engine is the reverse of that of the other two four-cylinder compounds of American build in that the high-pressure are upon the outside coupled to the rear pair of drivers, while the low-pressure are between the frames, are set ahead and drive to the front axle, which is cranked. The engine also differs in the use of the plate frame, which will thus be given another opportunity to demonstrate its applicability to American service.

The Walschaert gear is, of course, used, but it will be noted that the parts are partially covered and protected by the outside frame, a condition that does not obtain on the Prairie locomotive.



Plan of Rods on Baldwin Four-Cylinder Balanced Compound Atlantic (4-4-2) Type Locomotive.

Again, the wheel base of the leading truck is somewhat greater than we are accustomed to. It is 7 ft. 6½ in., while that of the American Atlantic type is but 6 ft. 4 in. The wheels are slightly larger, being 37¾ in. as against 36 in. on the American engine.

The principal dimensions are:

No. pairs of driving wheels, 2; diameter of same	80 3-16 in.
Size of driving axle journals	8¼x9 1-16 "
Length of driving wheel base	7 ft. 0½ "
Total wheel base of engine	28 " 6½ "
Total wheel base of engine and tender	59 " 5 "
No. wheels in engine truck	4

Diameter of wheels in engine truck	37 13-16 in.
Size of engine truck axle journals	5 15-16 x 9⅞ "
Spread of cylinders	85⅝ "
Size of cylinders..H.P.,14 3-16x25 3-16 in.; L.P.,23⅝x25 3-16	"
Steam ports: H.P.,1⅜x14 3-16 in.; L.P., 1 11-16x20⅜	"
Exhaust ports: H.P., 3⅛x14 3-16 in.; L.P., 3⅛x20⅜	"
Travel of valve	5½ "
Type of boiler	Belpaire narrow firebox.
Minimum internal diameter of boiler	58⅛ in.
Number of tubes	139
Outside diameter of tubes	2¾ in.
Length of tubes between tube sheets	173¼ "
Fire area through tubes	4.73 sq. ft.
Size of firebox inside	39⅜x119⅞ in.
Fire grate area	33.9 sq. ft.
External heating surface of tubes	2,435.7 "
Heating surface of firebox	181.1 "
Total heating surface of boiler	2,616.8 "
Steam pressure per sq. in.	227½ lbs.
No. wheels under tender....8; diameter of same	36 in.
Size of tender truck axle journals	5½x10 in.
Weight of engine, empty	147,400 lbs.
Weight on truck in working order	41,250 "
Weight on first pair of drivers	44,550 "
Weight on second pair of drivers	43,300 "
Weight on trailing wheels	34,900 "
Weight of engine in working order	164,000 "
Weight of tender loaded	132,500 "
Ratio of heating surface to grate surface	77.1
Ratio, external flue heating surface to firebox heating surf.	13.4
Tractive power with M. E. pressure equivalent to 4-5 boiler pressure	19,555 lbs.
Diameter of trailing wheels	60 11-16 in.
Size of trailing wheel axle journals	7⅛x9⅞ "

Philippine Railroad Projects.

BY L. E. BENNETT.

In 1901 and 1902, when civil government was just being established in the Philippine Islands, the Civil Commission, headed by Governor Taft, advertised for bids for the construction of extensive harbor improvement works and a complete system of electric surface railways on the streets of Manila.

Foothills on the Island of Negros.

A Clearing in the Hill Country.

Up to this time practically no American capital had been invested in the Philippines and no public work of any consequence had ever been carried out with Filipino labor, except the Manila & Dagupan Railway, 120 miles long, which had taken several years in building.

In response to these advertisements the Government received only one bid for harbor works which could be favorably considered, that of the Atlantic, Gulf & Pacific Company, of New York and San Francisco; and only one complete bid for the electric street railway system, that of J. G. White & Co., Inc., of New York, associated with Mr. Charles N. Swift, of Detroit. It was a virgin field for capital investment.

The representatives of these firms studied the situation most carefully on the ground, organized the work to suit the conditions and peculiarities of the natives, even going to the point of providing school houses and teachers, churches, music, dance halls and cock fighting pits for the amusement of the laborers, also hospitals and medical attendance, a system of lunch money, giving each laborer 10 cents cash each noon for his lunch so that the improvident ones would not go hungry, and by prompt and honest payment of wages and scrupulous care in complying with every promise made to the laborers, they quickly gained the confidence of the people, and have been most successful in securing labor in abundance, which has demonstrated that it is entirely feasible to depend upon carrying out the proposed construction of about 1,000 miles of steam railroads with the common native labor available in the islands. Moreover, it has been amply demonstrated that the native Filipinos appreciate and understand the advantages of good transportation facilities, and that they will patronize and utilize such public utilities, as shown by the results which have been obtained on the 34 miles of Manila Electric Street Railways now in operation about nine months.

When J. G. White & Co. and Mr. Swift undertook to finance and build this trolley system, it was not known whether the natives would patronize the railway when built. They believed in the project, risked their money, and have won out, as shown by the tremendous traffic. The Manila Street Railways have proven that a good return may be expected from capital judiciously invested in public transportation utilities in the Philippine Islands, and we may confidently look forward to the same results from the building of 1,100 miles of steam railroads about to be undertaken in the Islands.

On December 15th, there were opened in Washington, in the presence of the Secretary of War, the Governor General of the Philippines, and others, tenders for the construction and operation of the new lines proposed by the government under limited government supervision and guarantee of interest on bonds.

The government proposed in an advertisement to grant perpetual franchises, the terms of which may be readjusted after 30 years, to such persons or corporations as may propose to construct the advertised lines and operate them on the most advantageous terms to the Philippine Government. As an additional inducement to capital, Congress authorized a guarantee by the Philippine government of not exceeding 4 per cent. interest on 95 per cent. of the bonds of these lines, up to $30,000,000. Unfortunately, Congress had not yet shown any intention to deal fairly and liberally with the Islands in the matter of free trade or reduced preferential tariff rates at the time the bids were opened, and probably on that account only two tenders worthy of consideration were received, offering to construct about 720 miles out of a total 1,100 miles advertised. The bidders were Speyer & Company, of New York, on behalf of the Manila & Dagupan Railway Company, already built, and J. G. White & Co., Inc., of New York, the builders and managers of the present Manila Street Railway Company, who offered to build on behalf of Mr. Cornelius Vanderbilt, Kean, Van Cortland & Co., the lines to be built by J. G. White & Co. The lines tendered for by Speyer & Co. are the following: A line from Dagupan, the present terminus of the Manila & Dagupan Railway to San Fernando, a good seaport about 30 miles north in the Province of Union. The line will pass through a densely populated district and should pay well. A line from Manila to Botangas via Calamba, a branch to Lucena, Tayabas, from Santo Tomas, and a branch from Calamba to Santa Cruz Laguna, altogether about 130 miles. A line from Pasacao to Nueva Caceres and Albay in the southern part of the Island of Luzon, which is probably the richest "Manila hemp" district in the Islands.

All of these projected roads are good ones. Speyer & Co. offered to build them without any government guarantee of interest whatever. These lines will serve a very thickly inhabited country with a rural population of as high as 250 per square mile. The products of the soil along these lines are chiefly rice, hemp, corn, tobacco, sugar cane, fruits and vegetables; also large quantities of coprax or dried cocoanuts for extracting cocoanut oil, which is shipped to France, Germany and Denmark, where it enters largely into the manufacture of butter, soap, candles and many other manufactured articles.

Generally speaking, the Philippine railroads are more important as passenger lines than as freight carriers, and about 66 per cent. of the entire traffic is derived from passengers, while only about 33 per cent. is derived from freight traffic. The percentage of freight traffic is, however, increasing slowly.

Railroads are operated cheaply in Oriental countries on account of the cheap labor, operating expenses on the present existing lines

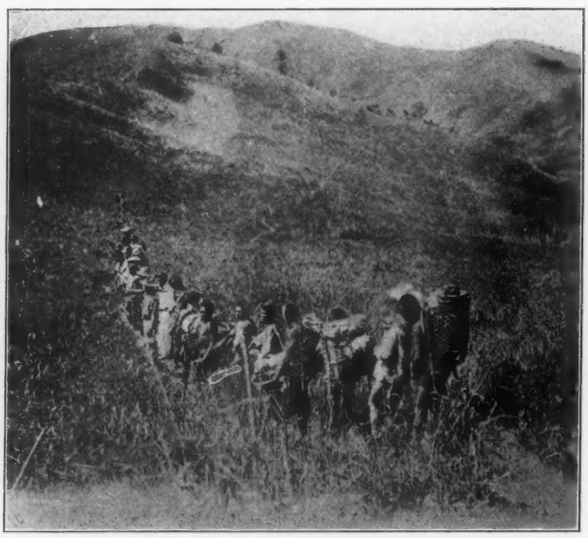
representing only about 45 per cent. of the charges. Natives make fairly good and very cheap section hands for maintenance of way, good foremen and engine drivers for locomotives, and possibly good telegraph operators and station agents.

The highest paid men are the machinists and locomotive engineers, who receive about $35 to $50 per month. Section hands earn about 30 cents per day, and foremen, station agents and telegraph operators from $15 to $25 per month. They are slow and in some respects unreliable, but generally more satisfactory than any other nationality for the work they have to do, and they are almost without exception sober, respectful and obedient to their superiors, all of which are important virtues not possessed by some foreigners in the Islands.

The fares for passengers are generally low, much lower than in the United States, and traffic is divided into three classes, first, second and third class. Fully 95 per cent. of the traffic is third class, and the present second class should really be abolished altogether. It is necessary to have first class, which will not be very profitable for some years, for the reason that there is a small percentage of foreigners and educated natives who object to riding with the poorer class of natives who form the bulk of the traffic.

Freight rates are high as compared with rates in this country, and range from $5 to $10 per ton for a 100-mile haul. Large freight cars do not pay, as an average car load is only about four tons, which accounts for the necessity of a high freight rate. It is almost impossible to get a full load for even a 10-ton car, as the natives ship in small quantities. Shipping is in the hands of many small dealers, and there are few merchants who ever ship a full car load of merchandise. The Chinese merchants are the largest shippers of merchandise, and by far the best business men in the islands outside of a very few prominent foreign houses who do almost exclusively an export and import business.

Native Bridge Over Mountain Stream.



Long Freight Train in the Mountains.

Railroads can only be made to pay on the larger islands and the cheap water transportation is always a serious factor of competition except from the interior of the larger islands down to the coast towns and vice versa. Along the coast, freight can be carried by native sail boats very cheaply.

The lines which are at present under consideration are narrow gage railroads, with a 3-ft. 6-in. track, and seem fairly well suited to the requirements of the island traffic. Trains make an average speed of about 16 miles an hour for passenger trains and 12 miles for freight. They follow the low lands wherever possible and have fairly easy grades and curvature. It is believed that in no case will the grades exceed 1½ per cent., and that only for inconsiderable portions of the line.

The greatest difficulty which has to be contended with is the extremely heavy rainfall which occurs within a few hours time, causing sudden and destructive floods and much damage to roadbed. This necessitates a very heavy expense for bridges and an abnormal provision for flood openings of all kinds. It is estimated that certain lines will require as much as 3 per cent. of the total mileage to be allowed for flood openings in the way of trestles, culverts and bridges over the whole line. The country is very much torn up and disturbed by seismic movements. In fact, the islands are still in the process of formation and the country has not yet found its equilibrium. It is almost impossible to find a good solid formation of rock, and road building in the mountains and hills is attended by huge land slides most disastrous and annoying to road building. There is scarcely any formation in the mountains which could not be worked out with a steam shovel. This has also played havoc with the mineral deposits of the islands, which are very extensive and widely distributed, but not concentrated enough to make mining successful as a general rule. The mountain tops are usually covered with dense vegetation and fine forests, but with the exception of tall, coarse grass and rank weeds, the valleys need no clearing or grubbing for railroad purposes.

The natives have no prejudices against railroad introduction and modern transportation facilities like the Chinese, and rarely ever disturb railroad property or obstruct the track and telegraph lines. In fact, they have shown great interest in the proposed roads and welcome the coming lines. Even extremely poor people gave the writer every assistance and accommodation within their limited means while inspecting the routes of the proposed lines in the interior country and evinced an unusual interest and enthusiasm over the prospect of railroad construction through their locality. They had some extraordinary ideas about what a railroad is like. Most of them had never seen one. One man in particular wanted to know if he could travel by rail as fast as a telegram, and others were quite surprised when it was explained that they would be able to travel as far in an hour as they could travel on foot at present in a day. They were much interested in knowing how much it would cost to ride on the railroad, and nearly all the young men expressed their desire to work for the road as soon as it started. Steel bridges several hundred feet long to carry a train were quite incomprehensible to them. And they said they had expected the trains would be ferried across all the large rivers in boats.

This ignorance of railroads, of course, refers to the southern islands. The people of Northern Luzon are more familiar with railroads which have been in existence in that section for 15 years. The people nearly all expressed their determination to ride on the trains when the road was built, and they will do so, as they are true sportsmen in that respect They earn very little money but if they have a dollar in the world they will spend it like a king, bet it on a cock fight or ride on the train; and they are good losers. They accept a winning or a loss with equally good grace.

When the native rides in the train he likes best to take his few belongings with him in the car where he can see them. He has not much faith in baggage cars and checks, and we are inclined to think rightly so from personal experience on the present existing lines. Especially does the native insist on taking with him his fighting cock on the train, street car or boat, wherever he goes, taking better care of it than of his wife and children.

A story is told that one day a train was stopped by a native lying asleep with his head on the rail. Fortunately the engineer saw him in time and stopped the train. When he was awakened he was quite free to admit that he went to sleep deliberately with his head on the rail because he was an employee and was supposed to be at work, and believed that, by sleeping with his head on the rail he would more easily hear the approach of the train and be up and working when the train passed.

Transportation through the interior at present, where no navigable stream exists, must of necessity be very slow and expensive. Where roads exist at all, and they are few and extremely bad, transportation is carried on by bullock carts carrying about 600 lbs. of cargo. These water buffaloes are able to make at best only about 14 miles a day, and travel in the early morning or night, never in the heat of the day. Transportation by this method under the

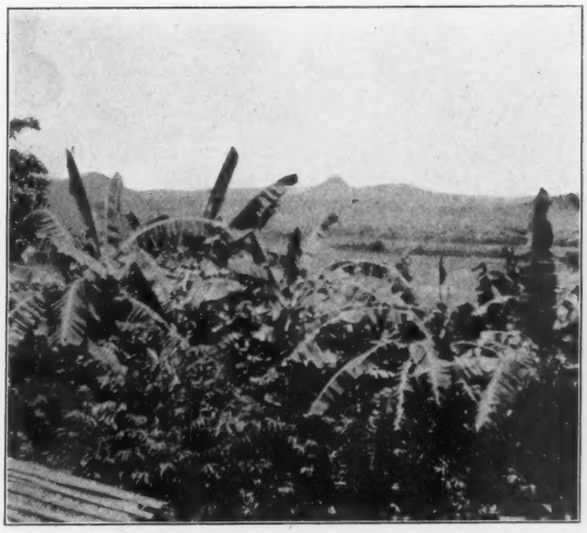
most favorable circumstances costs about 35 cents per ton-mile, and from that up to $1.50 per ton-mile.

Another mode of transportation where there are no roads, but only trails, is by pack animals or on men's backs. Men carry from 50 to 100 lbs. in this way and animals about 125 lbs. each. Transportation by this method costs from one cent a pound per day upwards, according to the scarcity of animals and men. Packers are able to make 18 to 20 miles per day and frequently make trips of five days' duration, or 100 miles. It will be seen that transportation of this class costs from $20 to $100 per ton, and that only a very few high class products, such as hemp, fine tobacco and cocoa can be moved with such freight rates.

Transportation of timber and logging operations are difficult or almost impossible, even where an abundance of fine timber exists, and there is a fair depth of water which would ordinarily float logs in the United States, for the reason that the Philippine woods are so heavy they will not float, and have to be floated with the assistance of bamboos or other light wood which has no market value. This shows the sore need of railroad facilities to develop the great resources of the Islands.

The greatest population live in the Visayan group of islands, including Panay and Cebu. In Cebu there is a population of 350 per square mile along the route of the proposed railroad. This island grows corn, rice, hemp, fruit and vegetables, and also has extensive coal deposits quite close to one of the terminals of the new railroad project. There is also an abundance of material available near the proposed line suitable for the manufacture of good Portland cement.

It is quite within the range of possibility that coal can be successfully mined in Cebu and cement manufactured for building and operating the railroads instead of importing it. It has never been systematically demonstrated whether these coal deposits can be continuously followed and mined or not.



Manila Hemp Growing Wild.

Rafting Lumber with Bamboo Floats.

The Island of Negros, it is believed, has the best ultimate prospect of successful development on a large scale of any island in the group. This island is entirely volcanic in formation and there are two principal craters, one active and the other extinct for several hundred years. The slope from the foot of the volcano to the sea is gradual and furnishes good drainage, sufficient to prevent the disastrous floods which occur on the flat valleys of some islands and about steep enough for irrigation purposes. The slopes are well watered with numerous streams which come down from volcanoes and irrigation ditches can be built cheaply. The formation is volcanic and thrown out by eruptions during thousands of years. This soil makes ideal sugar cane land and is similar and fully as good as the sugar land of Hawaii, but much better provided with water. At present only about 10 per cent. of the land is under cultivation, and that near the coast line, because there are no roads or transportation facilities in the interior, and the sugar, which is the principal product, is not worth the freight charges of an overland haul. Back from the coast are enormous areas of land better than that already cultivated, and entirely wild. At present about 80,000 tons of raw sugar a year is grown and exported from this island. This output is capable of expansion up to 400,000 tons a year with good transportation facilities, the introduction of modern methods of cultivation and sugar reduction and by utilizing the waste waters of the streams for irrigation purposes.

At present planting and cultivation are carried on by the crudest methods with a maximum of inefficiency and waste. There are a few Swiss and Spanish planters, but they are not much more progressive than the natives. Most of the plantations are operated by the natives. The natural market for Negros sugar is China and Japan. At present the Chinese are just beginning to use sugar, and with a market like China at her door, there is no real danger that Philippine sugar will swamp the United States and ruin the beet sugar industry. Negros can safely develop her full resources up to 400,000 tons of sugar per year, and sell it all in Asia.

Development will be slow, but eventually the Negros railroads about to be built should be excellent investments, and should pay operating expenses from the start. Already the natives and other planters are adopting new and improved methods of cultivation, and some of them have introduced, with considerable success, American plows, harrows, and other agricultural implements. One native stated that he was able to plow with an American disc plow five times as much per day as with an old-fashioned native plow, which merely scratched the surface.

The present land laws which prevent foreigners taking up more than 40 acres of land for an individual, and corporations more than 2,470 acres, has hurt the development of Negros. There is a prospect that Congress will modify this law at an early date.

Sugar can be cultivated only up to the foot of the slopes of the volcanoes, but, at higher elevations, other valuable products can be cultivated most successfully, and will be cultivated on an extensive scale when railroads are built. Some of these valuable products are rubber, gutta percha, cocoa beans, coffee, Manila hemp, and other products. Also, there are many valuable forest products, such as rattan and fine timbers.

In the northern part of the island there is, at the present time, an up-to-date American saw mill and logging outfit, owned by a New York firm. This is equipped with several miles of wire cable operated by winding engines for hauling logs down to the mill. The operations are considerably handicapped for want of transportation facilities, and the new railroads should be able to remedy this difficulty and develop a large and profitable lumber business.

Near Escalante, the proposed terminal, a splendid harbor can be developed by improving the Danao river some 600 ft. wide and dredging out the bar at the mouth. When this is done there will be a uniform depth of 35 to 50 ft. of water, and accommodation for anchorage of eight or ten large ocean steamers. Coal is said to exist on the island about nine miles from the Escalante station on the private property of a Spanish planter, but it is not known if the quality of the coal is good, nor if the deposit is capable of being worked to advantage.

The Islands of Cebu, Negros and Panay are located side by side, and only about 30 miles apart, or less. It is quite possible, if found desirable or necessary, to construct car ferries, and interchange cars, empty or loaded, as the requirements of traffic may demand.

The Island of Panay has a rural population of about 167 per square mile, and the population, which will be served by the 100 miles of proposed railroad, will approximate 629,000 inhabitants. The location of the railroad is practically a continuous village for many miles, and a continuous succession of villages over all but some 27 miles of the line where it passes through the hills. Here again are large areas of uncultivated lands in the interior, because there is no means of transportation. Railroads will change these conditions.

The land produces a great variety of products, such as Manila hemp, almost pure white and of a silky lustre; pineapple fiber,

of which grass cloth and "Jusi" cloth are made; also numerous other fibers for the manufacture of delicate and beautiful native cloth. Rice land is abundant and excellent. Coffee, cocoanuts, fruits, vegetables and poultry can be raised in abundance; also millions of sugar sacks are made for shipment to the sugar plantations of Negros. They are manufactured in nearly every household by the women and children, and are made from palm leaves. Nearly every house has one or more crude native looms for the weaving of grass cloth textiles referred to above, and they produce some delicate fabrics, which find a ready sale in the cities.

At Iloilo the government is building by contract extensive harbor improvement works, and dredging the river so that, ultimately, it is expected large ocean ships for Europe and the United States can load and discharge their cargoes inside the river at a wharf. At present, all cargo is handled by lighterage, which costs about $1.50 per ton. Also the harbor of Capiz, at the northern terminal of the island, is capable of development.

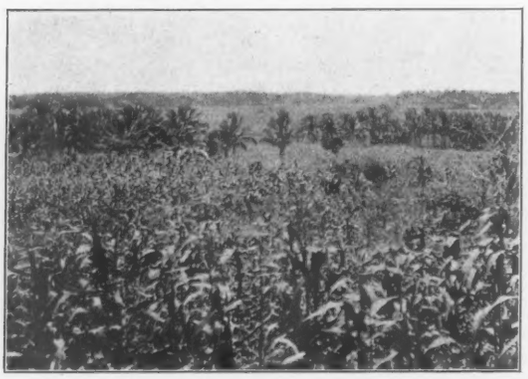
Labor is plentiful in all these three islands, except certain kinds of skilled labor. Common labor receives about 30 cents a day, and performs about one-quarter of a day's work as compared to our standard. Some skilled laborers, such as drillmen in rock excavation, receive 40 to 45 cents a day. Carpenters receive 50 cents, and machinists, boiler makers and riveters, blacksmiths, engineers, etc., from 60 cents to $2, according to their ability. This latter class of skilled mechanics is very scarce, and probably Japanese will have to be imported for the railroad construction to make up the deficit of skilled mechanics and riveters for bridge work.

When working in this country, or in isolated localities, it is advisable to spend considerable time, money and trouble in providing amusements for native laborers in order to make their surroundings more agreeable. With this object in view it is not unusual for engineers and contractors to provide dance halls, cock pits, and hire musicians for the principal camps, to make the men satisfied with their work; also to provide ample quarters for their families who accompany them on the work.

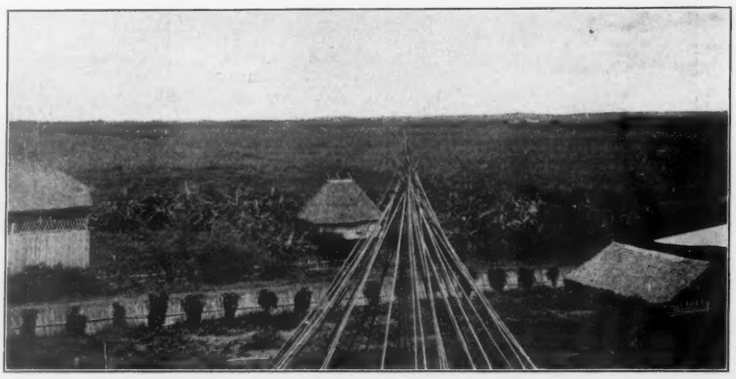
While considerable brigandage and lawlessness has been carried on in the interior of most all the islands in the past, the writer does not know of a single instance where the natives have molested engineers who were carrying out work where large numbers of native laborers were employed, and where considerable sums of money were being disbursed and scattered among the common people.

The 800 miles of railroad tendered for by Speyer & Co., and Messrs. J. G. White & Co., will cost, it is expected, in the neighborhood of $28,000,000, and if Congress treats the islands fairly and generously, as it should do, these railroads when built should mean to the islands the difference between poverty and prosperity, between lawlessness and business security.

Dao Village with Cocoanut Groves in Background.



Field of Sugar Cane in Lowlands.



Typical Native Plantation in Lowlands.

Foreign Railroad Notes.

The last fluid to make use of tank cars is milk. The practice grew up in Denmark, and for some months milk has been shipped long distances, and recently all the way to Berlin in such cars. The tanks, however, are not the boiler plate cylinders with which we are familiar, but consist of enormous wooden casks, each of 210 cu. ft. capacity, two of which are fastened to the floor of a covered freight car. For some time the German railroads charged freight only for the weight of the milk so shipped; but recently it has occurred to some one (probably to some milk producer who ships in cans) that while he was paying freight on his cans, the Danes were not paying any on their packages, which, though bolted fast to the car, nevertheless added to the weight to be carried. An end has been put to such discrimination.

In connection with the French Ministry of Public Works there is what is called an "advisory railroad committee." It was recently determined that all who have ever been at the head of this ministry shall be members of this committee. It now appears that this adds no less than 13 persons to the committee, which is a commentary on the short lives of French cabinets. A minister has hardly time to learn his way about his office before he must make way for a new man.

The Cologne *Gazette* affirms that it is virtually decided to work the Simplon Tunnel with electricity, and that from its first opening, which will be delayed until April or May. The Italian authorities are said to have urged this very strongly, and to have agreed to grant concessions of water power on their side and to loan some of the electric locomotives which for some years have supplied the motive power on the Valtellina Railroad. On the Swiss side, at Brieg, is already the plant which generated the electricity used during construction. Steam locomotives will be changed for electrical there; but the latter will haul the trains not only through the great tunnel but over the new line built to connect the tunnel at Iselle with the Italian railroad system at Domodossola, which has a number of tunnels, some of considerable length. The length of the line to be thus worked is 25 miles.

The island of Cyprus, which is more than twice as large as Long Island, had its first railroad opened Oct. 21 last, from the harbor of Famagusta to Nikosia, in the interior, 36 miles.

The German Dining Car Co. reports that at the end of its last fiscal year it possessed 50 dining cars, running on various routes. With these it earned net about $120,000, and paid 10 per cent. dividends, having paid tolls to the railroads which amounted to 6.4 per cent. on its stock. It has ordered four new cars, which will have six-wheeled trucks. The existing stock has four-wheeled trucks.

GENERAL NEWS SECTION

NOTES.

One of the members of the Georgia State Railroad Commission, Mr. O. B. Stevens, will hereafter spend most of his time in traveling about the state to investigate complaints in the localities where they arise.

John B. Horn, engineman of the Poughkeepsie train which was in collision with a New Haven train in New York City December 19, has been found responsible by a coroner's jury for disregarding the stop signal, and has been held by the coroner in $2,000 bail to await the action of the Grand Jury.

According to the Harrisburg *Star-Independent* the Pennsylvania Limited express train (23-hour train to Chicago) on Christmas day ran from Jersey City to Pittsburg, stopping at Philadelphia, Harrisburg and Altoona, without a single passenger. What was done with the perishable viands in the dining car is not stated.

At Chicago, December 29, the Grand Jury in the Federal Court returned indictments against the Chicago, Burlington & Quincy railroad and D. Miller and C. C. Burnham, officers of the road, for granting illegal rebates to the United States Steel Products Co., of New York. Twenty-six separate offenses are charged.

The Enterprise Transportation Co., running a steamboat between New York and Fall River, has complained to the Massachusetts Railroad Commissioners that the New York, New Haven & Hartford Railroad discriminates against complainant by refusing to honor baggage checks issued by the boat line, and in other ways.

A press despatch from Springfield, Ill., says that after hearing an application from the railroads for a modification of the recent order making a reduction of 20 per cent. in freight rates, the State Railroad Commissioners have decided that, so far as the first five classes are concerned, the order shall go into effect at once; but on the lower classes further investigation will be made.

The regulations for the transportation of explosives recently adopted by the American Railway Association have been made the rules of the State Railroad Commission of Massachusetts; and the Commission, acting under the law provided for the purpose (Sec. 99, Chap. 102,) has published the regulations in full in the Boston *Advertiser*, the Worcester *Telegram*, and the Springfield *Republican*.

At Chattanooga, Tenn., a suit has been filed against the Cincinnati, New Orleans & Texas Pacific for damages for the death, last August, of a switchman of the Southern Railway, who, it is claimed, was overcome by the fumes of formaldehyde in a sleeping car which had just been fumigated. In August strict sanitary precautions were enforced on account of the presence of yellow fever in the Gulf states.

The "Cuban Special," the 24-hour train of the Illinois Central between Chicago and New Orleans, made its first trip south December 26 and its first northward trip December 28. Both trains arrived on time. The distance is 923 miles. This is probably the only line in the world, so long as 900 miles, which trains traverse without changing watches. The schedules are made on Central Standard time all the way.

The Tehuantepec National Railway, which has for some time past been handling local traffic, is expected to be open for transcontinental traffic by July, 1906, by which date the works on the terminal harbors of Coatzacoalcos, on the Atlantic, and of Salina Cruz, on the Pacific, will be sufficiently advanced to permit steamers drawing 30 ft. to load and discharge at all times, in still water, alongside the quays direct into cars or warehouses as required.

After a conference with the Governor of Indiana, the passenger traffic officers of the principal railroads in that State have decided to issue an interchangeable mileage ticket, such as is desired by the Governor and by the traveling men for whom he speaks. Mr. Ford, of the Pennsylvania, is reported as saying that a mileage book will be sold at 2 cents a mile, but that it will not be sold for local traffic in any State; meaning, apparently, that the ticket will be made available only to and from junction points.

On a line of the Burlington Traction Co., Burlington, Vt., on October 7, two cars collided and sixteen persons were injured; and the Vermont State railroad commission finds that the collision occurred because one of the cars was overcrowded and in charge of an inexperienced motorman; also that he had no written orders to meet another car at an unusual place, the scene of the accident being a switch seldom used. The custom of employing inexperienced men and operating cars without specific orders prevails on nearly every electric railroad in the State, a "rash practice," says the commission.

The Union and Southern Pacific roads have put on a fast train between Omaha and San Francisco which carries nothing but mails. It will make the time westbound about 5½ hours quicker than the Overland Limited, and will save 24½ hours (from New York) over the time hitherto made by the regular mail train. Mail leaving New York at 3:15 a. m. on Tuesday; Chicago, 2:45 a. m. Wednesday, will reach Ogden at 3 p. m. Thursday and San Francisco at 12:30 p. m. Friday. Mail leaving San Francisco at 6 p. m. Monday will reach Chicago at 10:30 a. m. Thursday and New York at 11:53 a. m. Friday. The new train makes connections for Oregon and Washington, saving 12 hours, and with the San Pedro, Los Angeles & Salt Lake for Los Angeles.

In New York City last week A. C. Newburn, a traveling salesman arrested on a charge of forgery in signing the name of George E. Whitcomb to a ticket which he had bought from Whitcomb, was brought before Justice Leventritt on a writ of habeas corpus and was released from custody, the justice holding that no forgery had been committed. Whitcomb bought the ticket at the railroad office, was followed and seen to meet Newburn outside of the office; and then Newburn was followed until he presented the ticket for passage. He signed Whitcomb's name and was then arrested. Counsel declared that Whitcomb had authorized the writing of his name by Newcomb whenever he should be asked to do so by the railroad, and the court sustained the legality of this proceeding.

The Interborough Rapid Transit Co., New York City, has raised the pay of guards for the first year from $1.55 per day to $1.70. This is the second-year rate, and it will henceforth be the rate both for the first and the second years. The third-year rate is $1.80 and the fourth-year rate $1.95. First-year switchmen have been advanced from $2.15 to $2.25; and all switchmen receiving $2.35 are advanced to $2.40. The rate for hand switchmen will henceforth be $2.25 the first year and $2.40 thereafter. Clerks and starters working 12 hours a day are now allowed two days off each month, with pay. The Canadian Pacific has increased the wages of track foremen and laborers east of Fort William. The New York Central has made an increase of 10 per cent. in the wages of freight handlers at Little Falls.

Mr. Charles T. Yerkes, the well-known street railroad capitalist and manager, died in New York City December 28. He was born in Philadelphia in 1837 and opened a broker's office there in 1858. In 1861 he purchased a banking house, which he managed until his failure ten years later. In 1874 he resumed his business and became prominent in street railway operations, later extending his field of influence to Chicago, where he obtained control of the north and west side surface roads and several suburban and elevated roads. For some years past he has been prominently interested in building and managing the underground railroads in London. In latter years he was Managing Director of the Underground Electric of London, Limited, which was incorporated in 1902 and controls the Metropolitan, Metropolitan District, Great Northern, Piccadilly & Brompton, Baker Street & Waterloo, and Charing Cross, Eustin & Hampstead subways, and also the London United Tramways.

To Obey the Law.

The men who represented the western railroads in conference with the Interstate Commerce Commission at Washington, Dec. 28. were J. C. Stubbs, vice-president and traffic director of the Union Pacific and the Southern Pacific, who was the chief spokesman; G. T. Nicholson, vice-president of the Atchison, Topeka & Santa Fe; H. R. McCullough, vice-president of the Chicago & North-Western; J. H. Hiland, vice-president of the Chicago, Milwaukee & St. Paul; J. M. Johnson, assistant to the vice-president of the Missouri Pacific and allied lines; J. F. Holden, freight traffic manager of the Chicago, Rock Island & Pacific; J. W. Blabon, freight traffic manager of the Chicago & Alton; Howard Morris, vice-president and general counsel of the Wisconsin Central; C. L. Wellington, general traffic manager of the Colorado & Southern; C. Haile, traffic manager of the Missouri, Kansas & Texas; W. L. Martin, vice-president of the Minneapolis, St. Paul & Sault Ste. Marie; and E. E. Smythe, general freight agent of the Kansas City Southern.

The commissioners present were Messrs. Knapp, Clements and Cockrell. At the close, Chairman Knapp said: "The conference was not sought by the Commission, but its purpose was legitimate and commendable, and warrants the expectation of beneficial results. At a recent meeting in Chicago, the representatives of practically all the lines west of that city, from the Canadian border to the Gulf, adopted the following resolution:

" 'That a joint committee, representative of lines in Western Trunk Line Committee, the Trans-Missouri Freight Bureau, Southwestern Tariff Committee, and the Transcontinental Freight Rate Committee, be appointed and instructed to wait upon the Interstate Commerce Commission; declare the desire and purpose of the respective members of said committees or bureaus to co-operate with the Commission in the enforcement of the law to the extent of pointing out ways and means, and giving the Commission any specific

information that may come to our knowledge which will lead to effective inquiry in uncovering unlawful practices.'

"The object of that committee was to present this resolution, and assure the Commission of the united and determined disposition of the lines represented to conform to the law in good faith, and in every respect, and to aid the Commission in its enforcement. Pledges to this effect were given by all present, with the further promise to report every illegal transaction which may come to their knowledge, or of which they may have well-grounded suspicion.

"While this visit was unsolicited, as above stated, it was not unwelcome, and the Commission has no reason to doubt the sincerity of the movement or its practical value. That it will result in the complete discontinuance of wrongful practices is perhaps too much to expect, for time alone will test the degree of its usefulness, but a marked improvement in the observance of tariff rates may be fairly anticipated. If the promised co-operation is actually and continuously afforded, the payment of rebates and the granting of secret advantages will, it is hoped, be reduced to a minimum."

Completion of the Maumee Bay Straight Channel.

The Maumee bay straight channel, which makes possible Toledo's classification as one of the big ports on the Great Lakes, was completed on October 6th by the Great Lakes Dredge & Dock Company. It was finished just five days behind time on a six year contract. This is remarkably good work and close calculation on a job of its kind. The cost of the work was $950,000. For 48 months, working from early spring until navigation closed in the fall, a fleet of three dredges, three tugs and 12 scows, manned by 50 men, labored and battled with heavy seas and many storms. They dug blue clay which was so hard at times that sharp axes could not break it.

The harbor improvement is technically known to the Bureau of Navigation as "the straight channel," and is 400 ft. wide by 23 ft. deep throughout its entire length. The plans called for 22 ft. depth, but an extra foot was dredged to allow for fill. The channel is about 14 miles long, extending from the Lake Shore railroad bridge to the new fog station and lighthouse. The Government dredge performed the work between the bridges and the contractors did the work extending from the Wheeling bridge to the new lighthouse. All told, the government has spent $2,150,700 on the waterways improvements at Toledo, the additional sum of $124,000 having been spent on the old crooked Turtle Light channel which was abandoned in 1891.

When the straight channel was ordered dredged it was made 200 ft. wide by 17 ft. deep. In 1899 the work of widening and deepening the channel was undertaken, and it is this last piece of work which has just been finished. The contract was originally given to Lyden & Drews, which firm was later absorbed by the Great Lakes Company. The man who engineered this gigantic task of removing ten million cubic yards of earth in six years was Mr. James G. Murray, who is Manager of the lower lakes fleet for the company named. Mr. Wm. T. Blunt was the Government's engineer in charge.—*Steam Shovel News.*

Class Legislation.

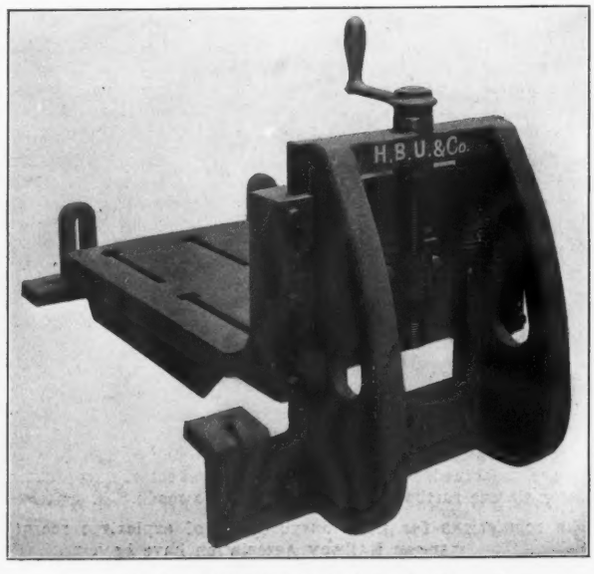
Jokes which were flourishing in the seventeenth century usually get laughed at, not because they were once funny, but because of their reflex humor, so to speak; the humorousness which one is compelled to feel at their hardihood in appearing in public after death. The bill to forbid sleeping car porters to let down the upper berth when the occupant of the lower isn't feeling pleasant, would seem to belong in the same class; though this notion dates back only to the middle of the nineteenth century. This year's manifestation occurred at Washington, on the third day of the session. The bill was presented by Mr. Brownlow; and how he came to waste two days in getting it before his colleagues is a mystery. Representative Brownlow, says the reporter, weighs nearly 300 pounds, and when he lies on his back he projects so far upward that the upper berth comes within painful proximity to his stomach. "I always travel in a lower berth," he said to a friend inquiring about the bill, "and, of course, if any one buys the upper berth I don't object to its being made up; but it is an outrage for a railroad company to put that lid on a fellow just for the fun of the thing." All the fat men in Congress who have long distances to travel in getting from their homes to the capital consider the bill as of more importance than those concerning the rebate question.

Proposed Railroad in Nicaragua.

Two new railroads to be built by American capital are projected in Nicaragua. The first is to connect the city of Managua, the capital, with the northwest part of the republic. This is to run through the States of Managua, Leon, Matagalpa, Jinotega and Segoira. Surveys are under way on some 175 miles. Henry Francis Lefevre, formerly connected with the Guggenheim Exploration Co., is Engineer of Construction. The road is to be built by the Nicaragua Concessions Co., which has been formed to take over a large number of concessionary rights in that country. The other road is to be built by the Great Central Railway of Nicaragua, which is controlled by the Nicaragua Concessions Co. It is to run from the head of navigation on the Coco river, on which the company now has steamboat service, about 250 miles into what is said to be a rich mineral region. Preliminary surveys for the first section of 60 miles have been completed. James Deibrick, Park Row Building, New York City, is connected with both companies.

A Lathe Attachment for Boring.

The accompanying illustrations show an ingenious arrangement made by H. B. Underwood & Co., Philadelphia, Pa., for converting a lathe to a horizontal boring mill. This attachment can be made to fit any size lathe, and it is claimed that with it an output equal to the output of a boring mill both in quantity and quality can be produced. It consists of a lower plate with an angle projecting down and



Boring Mill Attachment for Lathe.

fastened to the rear side of the lathe carriage. The surface of this angle plate is planed true with all the other parts of the attachment. For a 30-in. lathe the bed has three T slots for ⅝-in. or ¾-in. bolts, and is 31 in. long x 22½ in. wide. It is provided with a 5½-in. vertical adjustment. When set on the lathe carriage it is true with the carriage in all directions. By means of the vertical adjusting screw the table is either raised or lowered parallel with the

Boring Mill Attachment for Lathe.

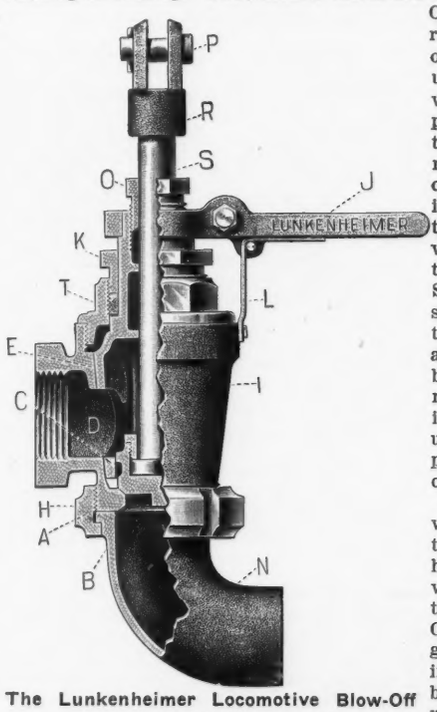
lathe shears. After being brought in position, the two slotted angle pieces (they having been previously bolted on the front of the carriage) are firmly attached to the table by the two screws shown, holding the bed to the lathe carriage. It can readily be seen that it gives a true adjustable bed equal to any well designed machine tool for holding pieces to be bored. In practice a 3-in. or 3¼-in. diameter bar with suitable cutterheads and automatic feed is desirable. By attaching one end of the boring bar to the face plate of the lathe, and the other end of the bar in the steady rest or other bearing, a powerful boring mill is produced which is entirely independent of the lathe centers. The weight of the device complete for a 30-in. lathe is 685 pounds.

Boston & Maine Pensions.

The question of establishing a pension department for the employees of the Boston & Maine, which has been under consideration for a number of months, appears to have been settled at a meeting of delegates of employees' organizations held at Boston, December 24. According to the reports of this meeting, the delegates (150 in number) voted unanimously in favor of a plan under which the employees will contribute to a pension fund 1 per cent. of their wages, and the railroad company will contribute an equal amount. It appears that the officers of the road had asked the employees to consider the matter and had virtually promised to adopt any reasonable plan which should be agreed upon. It is said that on the basis named, the contributions will amount to $300,000 annually, which was the sum appropriated by the Pennsylvania road four years ago; and on the Pennsylvania the number of employees must be several times as large as on the Boston & Maine. The details are yet to be arranged.

The Lunkenheimer Locomotive Blow-Off Valve.

The illustration herewith shows a new form of locomotive blow-off cock which has been applied on a number of locomotives recently built for several large railroads. The valve is operated by hand, and is constructed to eliminate any tendency to fouling, sticking or leaking. Two distinct valves are combined in one body. One of these is for regular use and the other for emergency use in case the main valve will not operate properly. The connection to the boiler is made at D and the outlet from the valve is through the ell at the bottom. The main valve disc is moved off the seat by the stem S, which is raised by suitable levers carried to an accessible point above the running board. By lifting the main valve as far as it will go a free and unrestricted passage is provided for the blow-off water.



The Lunkenheimer Locomotive Blow-Off Valve.

The emergency valve consists of the tapered plug C, which has a ground fit in valve body, and is rotated by the handle. Ordinarily, this emergency valve remains in an open position, but should the main valve fail to work properly the emergency valve can be turned part of a revolution and cut off the opening from the boiler connection. With the main valve raised to its full open position all blow-off operations can be performed with the emergency valve. As a further preventive for the failure of the main valve to seat tight, the valve disc is provided with an upper flange sliding loosely within the emergency valve C. As the main valve is lowered past the opening from the boiler this flange gradually reduces the opening, causing wire-drawing of the escaping water which bursts into steam and because of its high velocity is effective in washing away any sediment which may have been deposited on the main valve seat, and which would prevent its closing tightly. Should a piece of boiler scale become lodged in the opening it can usually be removed or broken up by giving the emergency valve a partial turn, and thus back again to the normal position. All parts of this valve are made to standard gages and templates, and any part which is broken or worn can be quickly and easily renewed. The valve was invented by Frederick Wertsheimer, Supt. M. P., Cincinnati, Hamilton & Dayton, and is made and sold by the Lunkenheimer Co., Cincinnati, Ohio.

Mr. Hill Discusses the Situation.

The *Wall Street Journal* quotes J. J. Hill as follows: I regard the business situation in this country to-day as no better than it was a year ago. The reason I think so is, that the Russian disturbance is a menace, the extent of which we cannot yet determine. Business in this country is at high pitch. As far as possible adverse legislation is concerned, we are not afraid of anything of the kind.

The problem in this country is how not to waste opportunity just as the problem of railroading is how not to waste train mileage. The duty of a railroad agent is not to sit on a rolling stool and figure on waybills as a 16-year old boy could do, but to stand on the platform and see that two cars are not used for freight that could be put in one. The duty of the country is to take advantage of its opportunities, some of which are leaving us and will not return.

We have put some large ships on the Pacific ocean and they sail for the Orient filled; but why are they filled? Because we fill them. This was our experiment. We do not think much of it as a source of profit.

What has this country got that it can export profitably in competition with Germany and other countries? It ought to have almost everything, but has it anything? We ship cotton to the Orient, but most of the cotton used there comes from India. There they pack their cotton better. The bales are 6 to 8 in. shorter than ours, the covering is neat and substantial. Our cotton covering is coarse and wears badly. We ordinarily ship about one-fifth of the cotton used in the Orient. This year we will ship not more than 10 per cent. We send them some cotton piece or cotton cloth goods, but they will not buy cotton above a certain price. Cotton is too high for them now.

A German consul has a residence where he can entertain people decently. An American consul has a room upstairs somewhere. The result is what you might expect.

I do not believe this country will ever have a merchant marine under its own flag, under existing laws. It costs us five times as much to dock a ship at one of the Pacific ports as it does at Nagasaki.

In some respects this country, industrially, is going the way of England, where the labor unions have dominated business with the result that there is no town in England of over 15,000 inhabitants where you cannot buy almost any important article to better advantage by selecting one of foreign make. German cutlery is sold in Manchester to-day to advantage. The glass works in England closed down and factories were started in Belgium, with the result that the English glass makers are out of employment.

Germany's laws governing industrial conditions are stringent and they are enforced. There a man works 11 hours a day, and if he makes a blunder such as destroying the fabric or material he is working on he is summarily discharged.

What has labor in this country to look forward to? Our immigration is 1,000,000 a year or more, and the natural increase in population is two and one-half times as much. There is homestead land left to be sure—the kind a man can starve on—and besides that there is the irrigated land being opened up, enough to supply the new population for a few years perhaps. And then what? If labor finds itself beaten in this country—and many think it is beaten now—it will have itself to blame. It will have killed the goose that laid its golden egg.

As for the railroads, they throw away too much of their product. They consume too many train miles for their ton-mile revenue. The rate problem in the west is different from that in the east. Great Northern's rate per ton-mile as compared with New Haven's is as .79 to 1.40. You can figure out what this would have meant in our revenue last year if we had the Consolidated Road's rate. The traffic density on the Pennsylvania system east of Pittsburg is six times that on Great Northern.

Main Line Electrification in England.

The Allgemeine Elektrizitäts Gesellschaft, acting in connection with the British Thomson-Houston Company (the English counterpart of the General Electric Company) has been given the contract to electrify the London, Brighton & South Coast Company's South London line. The conversion will take place over the track between Battersea Park Junction and Peckham Rye, a distance of about five miles. The Winter-Eichberg system, of which the Thomson-Houston Company own the British rights, will be adopted, and all the switch gear, together with most of the motors and control apparatus, will be made by the company in England. The first few motors are to be made by the A. E. G. in Germany, as that firm has already been successful in carrying out similar work. An English firm has secured the subcontract for the overhead equipment, so that British labor will be utilized for the major part of the undertaking. This has removed a certain amount of dissatisfaction resulting from the successful bid of the German firm. The main reason for the action of the directors was, however, that in adopting the Winter-Eichberg system they were not committing themselves to an untried method, but to one that had already been successfully put into practice, and of which the A. E. G. are the introducers.

Another Decision in Favor of the Railroad.

The Interstate Commerce Commission has announced its decision, in an opinion by Commissioner Cockrell, in the case of Brabham et al. against the Atlantic Coast line and the Charleston & Western Carolina. The passenger fare from Ellenton, S. C., to Augusta, Ga., 22 miles, is 80 cents, and from Jackson, S. C., to Augusta, Ga., 15 miles, 60 cents, and these fares are alleged to be unreasonable. The local passenger fares in South Carolina and

Georgia are controlled by a maximum of three cents a mile, fixed by state authority. Between the points named the Atlantic Coast Line has trackage rights over the other line, and all fares collected are turned over to the C. & W. C. The financial condition of the C. & W. C. is poor, and the traffic is light.

The Commission holds, first, that the rates fixed by the State Commissions of South Carolina and Georgia are presumptively reasonable, but such presumption is not conclusive, and the railroad companies are entitled to show the contrary in a case involving the rates on interstate traffic; second, that a railroad company is entitled to a fair return upon the value of that which it employs for public convenience, and that it is not apparent that the interstate passenger rates complained of are unreasonable.

Ohio Canals, Mines and Forests.

Governor Herrick of Ohio, in his annual message to the legislature, says that the State canals must either be rebuilt or abandoned. "It will not do to go on forever declaring for the maintenance of what we ironically call our 'waterways' and then permit them to sink gradually into a worse and worse condition of ruin and wretchedness. If the people want to keep them, the duty is plain and the way is clear. The State cannot both maintain and abandon the canals, what it has been trying to do for many years." The Governor recommends additional legislation to protect life and property in the mines in the State and the enactment of laws which will foster and preserve the rapidly diminishing forest areas of the State.

Manufacturing and Business.

The Railway Appliance Co., Chicago, successor to the Q. & C. Co., is distributing an amusing sketch entitled "Pigs is Pigs."

Wm. T. Butler has been appointed Pacific coast representative of the H. W. Johns-Manville Co., New York. His headquarters will be at San Francisco, with branch offices at Los Angeles, Cal., and Seattle, Wash.

The Association of American Portland Cement Manufacturers, Philadelphia, Pa., has just published a paper by Mr. Newberry, entitled "Concrete Building Blocks." The pamphlet is for free distribution, and may be obtained by addressing the association.

Henry C. Ebert, assistant to the Third Vice-President of the Westinghouse Electric & Mfg. Company, Pittsburg, Pa., has resigned his position to become the President of the Cincinnati Car Company and Vice-President of the Ohio Tractions Company. Mr. Ebert's connection with the Westinghouse Electric & Mfg. Company dates back about 15 years.

A contract has just been placed by the Louisville & Nashville with the Weir Frog Company, of Cincinnati, for the supply of all its frogs and switches for 1906. This contract is a renewal of a contract held many times by the Weir Frog Company, and is one that has been continuously held since the Weir Co. moved into its new plant at Norwood, one of the suburbs of Cincinnati.

The Westinghouse Electric & Manufacturing Company recently renewed an annual contract covering the requirements of the Moline Elevator Company, Moline, Ill., so far as its motor needs are concerned. The renewing of this contract is due to the highly satisfactory performance of Westinghouse elevator motors under the most trying conditions, their design and construction rendering them peculiarly adapted to the requirements of the severest elevator work.

Iron and Steel.

Contracts have been given by the Florida East Coast for 6,000 tons of rails and by the Western Maryland for 5,000 tons.

Contracts are to be let for 30,000 tons of steel castings for the American Locomotive Company, deliveries to be made at the rate of 2,500 tons per month.

The Twenty-third street ferry terminals of the Delaware, Lackawanna & Western, New York City, recently damaged by fire, will be rebuilt by the American Bridge Company.

The Pennsylvania Steel Company has been given a contract by the New York & Long Branch Railroad to build a bridge over the Raritan river, which calls for 5,000 tons of fabricated steel.

OBITUARY NOTICES.

—Mr. E. R. Reynolds, formerly Vice-President and General Manager of the Long Island, died recently at the age of 41.

—Mr. William S. Thorn, Assistant General Passenger Agent of the Minneapolis, St. Paul & Sault Ste. Marie, died at St. Paul, Minn., on December 26.

—Mr. Matthew P. Wood, Consulting Engineer, died recently in New York at the age of 70. During the Civil War, Mr. Wood was Superintendent of Motive Power of the Government Military railroads under General Herman Haupt.

—Mr. J. P. Hovey, formerly Superintendent of Motive Power of the Kansas City, Mexico & Orient, died recently at Wichita, Kan., at the age of 84. Mr. Hovey was connected with the Union Pacific for many years, and had been Master Mechanic on the Cleveland & Pittsburg.

—Mr. Edward Wilder, Secretary and Treasurer of the Atchison, Topeka & Santa Fe, died recently at Topeka, Kan. Mr. Wilder was born in Boston in 1843 and entered railroad service in 1859 as clerk in the Superintendent's office of the Boston & Worcester. After being promoted several times, he left that road in 1870 to become Land Commissioner of the Hannibal & St. Joseph. The next year he was appointed Assistant Secretary and Assistant Treasurer of the Atchison, Topeka & Santa Fe, being appointed to his last position in 1876.

—Mr. George B. Spriggs, General Freight Agent of the New York, Chicago & St. Louis, died recently at Cleveland, Ohio, at the age of 71. Mr. Spriggs was born in England and entered railroad service there in 1852 on the London & Northwestern. After holding several offices on this road, he came to the Great Western of Canada, where he was appointed General Freight Agent. In 1871, he was appointed Assistant General Freight Agent of the Baltimore & Ohio, but in 1877 returned to the Great Western of Canada as General Freight and Traffic Manager. This position he left in 1882 to take the office which he held at the time of his death.

—Mr. John Dougherty, who was for many years in the service of the Pennsylvania Railroad, died in New York December 28. He was born in Ireland in 1840 and entered railroad service in this country on the Pennsylvania in 1863. He was steadily promoted until he became Assistant Secretary. In 1880, he went to the Denver & Rio Grande as Comptroller and Assistant Treasurer, and in 1884 he became Treasurer, Auditor and Purchasing Agent of the Buffalo, New York & Philadelphia, now a part of the Pennsylvania. In 1888, he left railroading to become General Manager of the Colorado Coal & Iron Co. He was later Secretary and Auditor of the William Cramp Ship & Engine Building Co., resigning in 1899 to become President of the New York Continental Jewell Filtration Co., which position he held at the time of his death.

MEETINGS AND ANNOUNCEMENTS.

(*For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page* 24.)

Railway Signal Association.

The January meeting of this association, as heretofore announced, will be held at the Grand Union Hotel, New York City, on Tuesday next. The morning session is to begin at 11 o'clock and the afternoon session at 2.

United Engineering Society.

The directors of the American Institute of Electrical Engineers have appointed John W. Lieb, Jr., one of the three trustees to represent the Institute for three years on the board of trustees of the United Engineering Society, invested with the care and administration of the new United Engineering Building. Mr. Lieb succeeds Dr. Wheeler, elected President of the Institute. Work on the building is in active progress, and it is expected to lay the corner stone early in the spring.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Atlantic Coast Line.—W. R. Sullivan has been elected Assistant to the President.

Chicago, Cincinnati & Louisville.—By order of the Receiver of the Cincinnati, Hamilton & Dayton, the officers of the C., H. & D. have ceased acting as officers of the C., C. & L.

Cincinnati, Hamilton & Dayton.—J. L. Cramer, Assistant Comptroller of the Erie, the C., H. & D., and the Pere Marquette, has been appointed Comptroller of the C., H. & D. and the Pere Marquette.

Pere Marquette.—See Cincinnati, Hamilton & Dayton.

San Pedro, Los Angeles & Salt Lake.—W. H. Leete, Cashier and Paymaster, has been elected Treasurer, with office at Los Angeles, Cal., succeeding F. K. Rule.

Operating Officers.

Lehigh Valley.—R. W. Baxter, Superintendent at Wilkesbarre, Pa., has been appointed Superintendent at Buffalo, N. Y., and also Superintendent of the lake lines of the Lehigh Valley Transportation Co., succeeding J. T. Keith, resigned. J. F. Maguire succeeds Mr. Baxter.

Little Rock & Hot Springs Western.—H. E. Martin, Acting General Superintendent, has been appointed General Superintendent of this road and of the Pine Bluff Western, succeeding G. L. Morris, resigned, with office at Hot Springs, Ark.

Missouri Pacific.—G. H. Stapp, who was recently appointed Superintendent of the Joplin division, was born in 1872. His first railroad service was in 1887 as an operator on the Pennsylvania Lines West. He became chief clerk to the Superintendent of the Louisville division of that road in 1894 and assistant trainmaster in 1902. In 1904 he resigned to go to the Chicago, Rock Island & Pacific, where he was for a time in the office of the General Superintendent of Transportation. He then went to Logan, N. Mex., as Superintendent in charge of the switchback at that point. In June, 1905, he went to the Maintenance of Way department of the Missouri Pacific, being appointed Superintendent of the Joplin division in December.

Mobile, Jackson & Kansas City.—E. W. Davis, Chief Clerk to the General Manager, has been appointed Car Accountant, succeeding William O'Rourke.

Northern Pacific.—D. Boyle, Superintendent at Livingston, Mont., has been appointed Assistant General Superintendent, with office at the same place. Mr. Boyle's authority will extend over the Yellowstone and Montana and the Rocky Mountain divisions. F. N. Finch, Chief Clerk to the General Manager, succeeds Mr. Boyle.

Philadelphia, Baltimore & Washington.—James Buckelew, Principal Assistant Engineer, has been appointed Superintendent at Media, Pa., succeeding C. J. Bechdolt, deceased.

Southern.—W. N. Foreacre, Superintendent at Atlanta, Ga., has been appointed Assistant General Superintendent of the Western division, with office at Birmingham, Ala. Mr. Foreacre's authority will extend over the Asheville, the Mobile, the Atlanta, the Birmingham and the Nashville divisions.

Traffic Officers.

Atlantic Coast Line.—H. M. Emerson, Traffic Manager, has been appointed General Traffic Manager, and the office of Traffic Manager has been abolished. R. A. Brand, General Freight Agent at Wilmington, N. C., has been appointed Freight Traffic Manager. W. J. Craig, General Passenger Agent, has been appointed Passenger Traffic Manager. J. W. Perrin, Assistant General Freight Agent, has been appointed General Freight Agent of the First division. C. McD. Davis has been appointed Assistant General Freight Agent of the whole system. The offices of all will be at Wilmington, N. C.

Central of Georgia.—J. M. Mallory has been appointed Industrial Agent, with office at Savannah, Ga., reporting to the Second Vice-President.

Chicago, Burlington & Quincy.—F. E. Bell, City Passenger Agent at Chicago, has been appointed Assistant General Passenger Agent.

Cincinnati, Hamilton & Dayton.—C. L. Thomas, Assistant Freight Traffic Manager of the Erie, has been appointed General Traffic Manager of the C., H. & D.

Erie.—The office of S. P. Shane, Freight Traffic Manager, has been moved from New York to Chicago. F. A. Wann, Freight Traffic Manager, and C. L. Thomas, Assistant Freight Traffic Manager of the lines west of Buffalo and Salamanca, have resigned. See Cincinnati, Hamilton & Dayton.

Missouri River & Northwestern.—G. P. Corey has been appointed General Traffic Manager, with office at Rapid City, S. Dak.

Pere Marquette.—A. Patriarche, Freight Traffic Manager, has been appointed General Traffic Manager.

Vera Cruz & Pacific.—C. Cardona, Auditor, has been appointed General Freight and Passenger Agent.

Wheeling & Lake Erie.—W. C. Maxwell has been appointed Assistant General Traffic Manager of this road and of the Wabash-Pittsburg Terminal, with office at St. Louis, Mo.

Engineering and Rolling Stock Officers.

Canadian Pacific.—C. Kyle, Master Mechanic at North Bay, Ont., has been appointed Master Mechanic at Montreal, Que., succeeding J. B. Elliott, promoted. G. T. Fulton, General Foreman at Carleton Junction, Ont., succeeds Mr. Kyle.

Houston & Texas Central.—S. Millican, heretofore Acting Superintendent of Motive Power and Machinery, has been appointed Superintendent of Motive Power and Machinery of this road and also of the Houston East & West Texas and the Houston & Shreveport; office at Houston, Tex.

Pennsylvania Lines West.—J. W. Barrie, Engineer of Maintenance at Toledo, Ohio, has been appointed Engineer of Maintenance at Chicago, succeeding N. Neff, transferred. R. C. Harris, Engineer of Maintenance at Cambridge, Ohio, succeeds Mr. Barrie. Guy Scott, Assistant Engineer at Chicago, succeeds Mr. Harris.

LOCOMOTIVE BUILDING.

The Chicago, Rock Island & Pacific has decided to order 50 additional locomotives.

The Union, it is reported, has ordered three locomotives from the American Locomotive Co.

The Harriman Lines have ordered from the Baldwin Locomotive Works 15 compound Atlantic (4-4-2) locomotives and 19 heavy consolidation (2-8-0) locomotives for the Union Pacific; 23 heavy consolidation (2-8-0) locomotives, six Pacific (4-6-2) locomotives and 10 switching locomotives for the Oregon Short Line; 25 heavy consolidation (2-8-0) locomotives, six Pacific (4-6-2) locomotives, and 14 switching locomotives for the Southern Pacific, and three Pacific (4-6-2) locomotives for the Oregon R. R. & Navigation Co. These locomotives are to be constructed under the same specifications as the original order of 140 locomotives, descriptions of which were published in our issue of September 22 last. This makes a total of 261 locomotives ordered in 1905 for their requirements in 1906 and 1907.

The New York, Philadelphia & Norfolk, as reported in our issue of December 15, has ordered two simple 10-wheel locomotives from the Baldwin Works for February, 1906, delivery. These locomotives will weigh 147,975 lbs., with 117,000 lbs. on drivers; cylinders, 20 in. x 26 in.; diameter of drivers, 6 ft.; type of boiler, Belpaire, with a working steam pressure of 180 lbs.; total heating surface, 2,395 sq. ft.; 290 iron tubes, 2 in. in diameter x 14 ft. 10 in. long; firebox, 105 in. x 60 in.; grate area, 43.7 sq. ft. The tender will have a capacity for 6,700 gallons of water and 10 tons of coal. The special equipment includes: Westinghouse air-brakes, Franklin magnesia boiler lagging, National-Hollow brake-beams, steel back brake-shoes, Munton pivoted couplers, Sellers injectors, U. S. metallic piston and valve rod packings, Coale muffled safety valves, Leach pneumatic sanding devices, Detroit sight-feed lubricators, Crosby steam gages and steel wheel centers.

The Canadian Northern, as reported in our issue of September 15, has ordered 20 simple 10-wheel (4-6-0) locomotives from the Canada Foundry Co., Toronto, for delivery commencing in May; 10 simple 10-wheel (4-6-0) locomotives from the Locomotive & Machine Co., for April delivery; 10 simple 10-wheel (4-6-0) locomotives from the Canadian Locomotive Co., for July and August delivery, and four simple six-wheel switching (0-6-0) locomotives from the Canada Foundry Co., Toronto, for April delivery. The 20 10-wheel locomotives will weigh 160,000 lbs., with 130,000 lbs. on the drivers; cylinders, 19 in. x 26 in.; diameter of drivers, 57 in.; extended wagon top boiler, with a working steam pressure of 200 lbs.; heating surface, 1,901 sq. ft.; 240 tubes, 2 in. in diameter and 14 ft. long; firebox, 9 ft. 1⅜ in. long and 3 ft. 6 in. wide; grate area, 31.8 sq. ft.; tank capacity, 5,000 imperial gallons of water, and coal capacity, 11 tons. Ten of the 10-wheel locomotives will weigh 135,345 lbs., with 105,785 lbs. on the drivers; cylinders, 18 in. x 24 in.; diameter of drivers, 62 in.; radial stayed wagon top boiler, with a working steam pressure of 200 lbs.; 248 tubes, 2 in. in diameter and 13 ft. $2^{9}/_{16}$ in. long; firebox, 103 in. x 42 in.; tank capacity, 5,000 imperial gallons of water, and coal capacity, 10 tons. The other ten 10-wheel locomotives will weigh 135,000 lbs., with 107,000 lbs. on the drivers; cylinders, 18 in. x 24 in.; diameter of drivers, 63 in.; radial stayed wagon top boiler, with a working steam pressure of 200 lbs.; 236 tubes, 2 in. in diameter and 13 ft. long; firebox, 102 in. x 41 in.; tank capacity, 5,000 imperial gallons of water, and coal capacity, 10 tons. The switching locomotives will weigh 130,000 lbs.; cylinders, 19 in. x 24 in.; diameter of drivers, 50 in.; straight top boiler, with a working steam pressure of 180 lbs.; 260 tubes, 2 in. in diameter and 10 ft. 6 in. long; firebox, 96 in. x 42⅝ in.; tank capacity, 3,200 imperial gallons of water, and coal capacity, six tons. The special equipment for all includes: Westinghouse air-brakes, asbestos boiler lagging, Simplex brake-beams, Monarch couplers, Pyle-National electric headlights for six of the 10-wheel locomotives, Ohio and Gresham injectors, Canadian Bronze Co.'s journal bearings, Brydges sanding devices and Detroit sight-feed lubricators.

CAR BUILDING.

The Tacoma Eastern will shortly order 10 additional coal cars and five box cars.

The Illinois Traction System has ordered six cars from the Cummings Car Co.

The Toledo & Indiana has ordered four large interurban cars from the Jewett Car Co.

The Colorado & Southern, it is reported, will build several dining cars at its own shops.

The Louisiana & Arkansas has ordered 75 flat cars of 60,000 lbs. capacity from Barney & Smith.

The National of Mexico, it is reported, is in the market for 300 gondola cars of 80,000 lbs. capacity.

The Evansville, Suburban & Newburg has closed contracts for one baggage car and three passenger cars.

The Detroit United Railway has ordered 10 interurban and some single truck cars from the Cincinnati Car Co.

The Delaware, Lackawanna & Western has ordered 50 Hart convertible cars from the Rodger Ballast Car Co.

The Evansville & Terre Haute has ordered 1,500 gondola cars of 80,000 lbs. capacity from the American Car & Foundry Co.

The International Railway, Buffalo, N. Y., has ordered 100 cars from the J. G. Brill Co., but the details have not yet been definitely decided.

The Chicago Great Western, as reported in our issue of December 29, will build 200 36-ft. box cars of 70,000 lbs. capacity at its own shops. The special equipment includes Barber trucks.

The St. Louis Construction & Equipment Company, as reported in our issue of December 22, is considering the purchase of 1,000 cars. As yet nothing definite has been settled in regard to the details of this work.

The Maine Central has ordered two second-class passenger coaches from the Wason Manufacturing Co. for February, 1906, delivery. These cars will measure 60 ft. 5 in. long over end sills x 9 ft. 8 in. wide. The bodies and underframes will be of wood.

The Boston & Maine, as reported in our issue of December 29, has ordered 1,000 box cars from the Pressed Steel Car Co. for April, 1906, delivery, and 500 box cars from the Pullman Co. for November, 1906, delivery. These cars will have a capacity of 60,000 lbs. and will weigh 32,900 lbs. They will measure 36 ft. x 8 ft. 6 in. wide x 8 ft. high inside. The bodies and underframes will be of wood. The special equipment includes: Wrought iron axles, Pressed Steel bolsters, Simplex brake-beams, cast-iron brake-shoes, Westinghouse brakes, lead-lined brasses, Gould couplers, Miner tandem draft rigging, Gould dust guards and journal boxes, Railway Steel Spring Co.'s springs, Fox pressed steel trucks and 33-in. 600-lb. cast-iron wheels.

The Canadian Northern, as reported in our issue of December 15, has ordered 1,000 36-ft. box cars of 60,000 lbs. capacity, for August delivery; 300 flat cars of 60,000 lbs. capacity, for delivery before May 31; ten 69-ft. 2-in. day coaches and three 60-ft. baggage cars from Rhodes, Curry & Co.; and ten 56-ft. day coaches, and five 60-ft. mail and express cars for July delivery, from the Crossen Car Manufacturing Co. The special equipment for all includes: Simplex bolsters and brake-beams for box and flat cars and Simplex brake-beams for passenger cars; Westinghouse air-brakes; Canadian Bronze Co.'s brasses; Monarch steel couplers for box and flat cars; Chicago steel couplers for passenger cars; Forsyth curtain fixtures for the 69-ft. 2 in. day coaches; Jones door fastenings for box cars; Miner draft rigging; Safety Car Heating & Light Co.'s heating system and Commercial Acetylene Co.'s safety light for passenger cars; American Asphaltum & Rubber Co.'s roofs for box cars; Diamond frame trucks for box and flat cars, and Canadian Northern standard trucks for passenger cars; Pullman wide vestibules for day coaches, and Rhodes, Curry & Co.'s wheels for box and flat cars, and steel tired wheels for passenger cars.

The Chicago, Indianapolis & Louisville cars reported in our issue of December 22, are to be equipped with the Curtain Supply Co.'s curtain fixtures instead of with Dayton Supply Co.'s curtain fixtures, as stated.

BRIDGE BUILDING.

Baltimore, Md.—The Western Maryland, it is said, is planning to build a bridge over North avenue, at its Walbrook station, to carry double tracks, replacing the present single-track structure.

Bonaventure, Que.—The town council will build a steel bridge over the Bonaventure river at this place.

Brownsville, Tex.—Announcement has been made that the St. Louis, Brownsville & Mexico will build a bridge over the Rio Grande river, connecting this place with Matamoras.

Carthage, Tenn.—Plans are being made for building a bridge over the Cumberland river at this place.

Gravenhurst, Ont.—The Dominion Railway Commissioners have approved the plans for two steel bridges on the Kleinburg-Sudbury branch of the Canadian Pacific Railway, one over the Muskoka river and the other across the outlet of the same river near Bala.

Houston, Tex.—Bids are wanted January 11 by John B. Ashe, County Auditor, for building a bridge over Cypress creek on East Montgomery road.

Indianola, Miss.—The Bellefontaine Bridge & Iron Co. will put up a bridge and viaduct 360 ft. long at this place.

Lethbridge, N. W. T.—The Canadian Pacific has completed the surveys for a 6,000-ft. trestle bridge at this place, to cross Belly river flats.

Lewisburg, Pa.—Union County Commissioners are planning to build a bridge over the Susquehanna river at this place to cost about $100,000.

Norristown, Pa.—The County Commissioners have given contracts to the Canton Bridge Co., at $18,100, for the superstructure and to James T. Smith of Perkiomenville, for the substructure, at $9,474, for the inter-county bridge over the Schuylkill river near Pottstown.

Pembroke, Ont.—A steel bridge, costing $25,000, will be built over the Madawaska river here.

Roanoke, Va.—A contract has been given by the Tidewater Railroad to the Virginia Bridge & Iron Co., of Roanoke, Va., for building a large number of bridges and a long iron trestle on its proposed road west from this place. The cost of the work will be about $650,000.

Seaforth, Ont.—The County Engineer has recommended that the following bridges be built as early as possible in 1906, all with steel superstructure on concrete abutments: Jamestown bridge, 110 ft. clear span; Day's bridge, with one span 120 ft. clear; Belgrave bridge with a 25-ft. span.

Tacoma, Wash.—Bids are wanted by the Board of County Commissioners January 5 for building a bridge over Rock creek in Pierce County. I. M. Howell is County Auditor.

Other Structures.

Birmingham, Ala.—Bids will soon be asked by the Southern for putting up a union passenger station here.

Chattanooga, Tenn.—Application has been made by the Chattanooga Station Co., which has applied for a charter with a capital of $100,000, to build a new passenger station for the Southern Railway. The incorporators of the company include: H. Fonde, T. H. Cooke and others.

Detroit, Mich.—The Wabash, it is said, has bought 60 acres of land at Oakwood, which will be used as a site for new yards. The work includes the building of a new roundhouse.

Indianapolis, Ind.—Official announcement has been made by the Cleveland, Cincinnati, Chicago & St. Louis that an appropriation of between $2,000,000 and $3,000,000 has been made for new shops at Indianapolis.

New Orleans, La.—Bids are wanted February 6 by the Board of Port Commissioners for building seven new steel sheds over the new wharves, at a cost of about $400,000.

Salt Lake City, Utah.—The Rio Grande Western, it is reported, will replace its shop recently destroyed by fire with a new structure to cost $60,000.

Spokane, Wash.—The Oregon Railroad & Navigation Co., it is said, is ready to begin work on its proposed passenger station on the north side of the Spokane river, to cost about $50,000.

Watertown, N. Y.—The New York Central has decided to spend about $500,000 on a new passenger and freight house and a new yard.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Arizona & California (A., T. & S. F.).—A contract has been given by this company to the Grant Bros. Construction Co., of Los Angeles, for building an extension of its road from Mile 50.47 to Mile 60 in Arizona, a distance of 9½ miles. Surveys are also being made for an additional 49 miles to Barker, Ariz.

Atchison, Topeka & Santa Fe.—See Jasper & Eastern below.

Atlantic & Western.—Surveys have been completed by this company for its projected road from Broadway, N. C., to which point the road is now finished to Goldsboro, an additional 70 miles.

Chicago, Lake Shore & South Bend (Electric).—A contract has been given by this company to the John R. Lee Construction Co., of New York, for building an electric railroad from South Bend west through Laporte and Porter Counties, Ind., to connect with the portion of the road between Indiana Harbor and South Chicago, now in operation. The company has increased its capital stock to $6,000,-

000 and authorized a bond issue of $3,000,000 to secure funds to carry out the work.

CHICAGO, ROCK ISLAND & GULF.—An officer writes that contracts have been let and work begun on building a road from Amarillo, Tex., west to the Texas-New Mexico state line, 70 miles. Surveys have also been made for an extension from Dallas, Tex., southeast to Houston, 228 miles.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Bids are wanted January 7 by W. M. Duane, Superintendent of Construction, Cincinnati, Ohio, for grading on relocation of single track of the Cairo division. The work calls for the excavation of 665,000 cu. yds. (See Advertising page 22.)

COAL RIVER.—This company, which operates 18 miles of road and recently laid track on five miles from Holleyhurst, W. Va., to Bull Creek, has given a contract to J. C. Carpenter & Co., of Clifton Forge, Va., for building an extension from Sproul to Rock Creek, 17½ miles. The company also intends to build 35 miles additional.

COUNCIL CITY & SOLOMON RIVER.—An officer writes that this company, which recently completed five miles on its road as far as John's creek, Alaska, will build an extension, for which surveys are being made, for an additional 35 miles toward Council City.

CONWAY COAST & WESTERN.—This company, which recently completed 12 miles of road from Conway, S. C., north to Cool Spring, is building an extension from the latter place to Ayner, a distance of about four miles.

DELAWARE & EASTERN.—This company, which recently completed 10 miles of its proposed road from Arkville, N. Y., southwest to Union Grove, has given a contract to J. R. Dolan & Co., of Downsville, N. Y., for building its proposed road from Union Grove southwest to East Branch, N. Y., 25 miles, and from Shaverton north to Andes, an additional eight miles.

DENVER, ENID & GULF.—See Denver, Kansas & Gulf below.

DENVER, KANSAS & GULF (D., E. & G.).—An officer writes that this company has under construction a line from Kiowa, Kan., north to Great Bend, a distance of 100 miles. (Sept. 22, p. 95.)

DULUTH, MISSABE & NORTHERN.—Contracts have been given by this company to the Drake & Stratton Co. and to John Runquist, both of Duluth, and also to Winston Bros. Co. & Werdenhoff, of Minneapolis, for building the extension of its road from Alborn, Minn., to Buckeye mine, a distance of 55 miles.

DULUTH, ST. CLOUD, GLENCOE & MANKATO.—A contract has been given by this company to E. L. Tobie & Co., with offices at New York and at Freeborn, Minn., for building its proposed road from Albert Lea, Minn., northwest to Mankato, a distance of 52 miles. The company is also making surveys for extending the line from Albert Lea to Duluth, a total distance of 287 miles.

GLEN COVE (LONG ISLAND).—This company is planning to build an extension from School street, Glen Cove, N. Y., to Garvies Point, 1.25 miles.

GREAT NORTHERN OF CANADA.—An officer writes that surveys are being made by this company to extend its line from Garneau Junction, Quebec, to Quebec, 80 miles.

GULF & SHIP ISLAND.—This company, which has recently completed eight miles of railroad from Silver creek south and 13 miles north from Columbia, Miss., is to build a connecting link 11 miles long between these two portions of its road. The contract has been given to the Bradford Construction Co., of Gulfport, Miss.

ILLINOIS CENTRAL.—An officer writes that surveys are being made by this company for building a line from Corinth, Miss., southeast to Haleyville, Ala., a distance of 80 miles.

See Yazoo & Mississippi Valley below.

ILLINOIS, IOWA & MINNESOTA.—This company, which operates 125 miles of railroad from Rockford, Ill., southeast to Momence, is making surveys to extend the road from its northern terminus northeast to Milwaukee, Wis., a distance of 100 miles.

INDIANA HARBOR.—A contract has been let by this company to the F. L. Hartigan Construction Co., of Chicago, Ill., for building a branch from Indiana Harbor, Ind., southeast to Dune Park, 18 miles.

INTERNATIONAL (CANADA).—Work has been commenced by K. A. Morrison and Alex. Finlayson, of Sable River, N. S., extending this road from North Sydney to Sydney Mines, N. S., a distance of 2.6 miles.

JASPER & EASTERN (A., T. & S. F.).—This road, which has recently been completed to Deridder, La., is to be extended 17 miles to Pickering. The work is being done by the Lantry-Sharpe Contracting Co., of Kansas City, Mo.

KANSAS CITY, MEXICO & ORIENT.—An officer writes regarding the work to be carried out by this company during 1906 that the line east from Wichita, Kan., probably to Emporia, and possibly to Osage City will be completed. The company also expects to build a line south from Custer City to a connection with the line building north from Sweetwater, Tex. The completion of this line will give the company a continuous line from Sweetwater, Tex., to Osage City, Kan. In Mexico the company will probably complete about 32 miles east from San Sostenes and possibly may double-track this distance. West from Bocoyna, about 60 miles additional will be built in the mountains. On the west coast, from Las Hornillas east, the line will probably be extended to La Junta, which is about 125 miles from Topolobampo. The company proposes also to build several hundred miles besides the lines here named.

LONG ISLAND.—See Glen Cove above.

LOUISVILLE & NASHVILLE.—An officer writes that grading for the following construction work is now under way:

Henderson division; revision of line and grades between Greenbrier, Tenn., and Guthrie, Ky., a distance of 25.7 miles. Walton, Wilson, Rodes & Company, Knoxville, Tenn., are the contractors.

For revision of line and grades, Bakers Hill, Henderson division; Mason & Hoge Company, Frankfort, Ky., contractors.

Knoxville division; revision of line and grades from Saxton, Ky., to Corbin, Ky., 25.9 miles. Contract for this work let to Edington, Griffitts & Company, Knoxville, Tenn., and Southern Contracting Company, Ludlow, Ky.

Atlanta, Knoxville & Northern Railway; Atlanta connection, extending from Ellen N. on the Western & Atlantic Railroad to a connection with the Atlanta Belt Line, West End, Atlanta, 6.2 miles in Georgia. The contractors are Wm. J. Oliver, Knoxville, Tenn.; Wright, Williams & Wadley, Dalton, Ga., and A. C. Wright and J. T. Pruden, Atlanta, Ga.

A contract for building a branch line up the left-hand fork of Straight creek has been let to the Callahan Construction Company, Knoxville, Tenn.

MCCLOUD RIVER.—This company, which has recently completed seven miles of road in California, has projected a road to run from McCloud west to Mott, 17 miles, and from the end of the present track north to Merrill, Ore., an additional 77 miles.

NEW YORK, NEW HAVEN & HARTFORD.—A contract has been given by this company to the T. Stuart & Son Co., of Boston, for building an extension from a point near West Roxbury west to Needham, Mass., a distance of 4.35 miles.

NORFOLK & WESTERN.—An officer writes that this company has work under way which will be completed during 1906 as follows:

Iaeger & Southern R. R.—This road has recently been completed from Lynn, W. Va., up Dry fork of Tug river to coal fields for a distance of 20 miles, and will be extended 4.6 miles.

Speedwell Extension.—This line, recently extended from Cripple Creek, Va., one mile to ore properties, will be extended for an additional five miles.

Pocahontas & Western will be extended 3.7 miles.

Blackstone & Lunenberg will be extended 5.75 miles.

OREGON SHORT LINE.—This company, which recently completed 8½ miles of road from the Logan Sugar Works to Wellsville, Utah, has given a contract to Soren Hausen, of Hyrum, Utah, for building an extension from the latter place north to Mendon, a distance of five miles.

PACIFIC & IDAHO NORTHERN.—An officer writes that a contract has been let by this company to Slick Brothers, of Council, Idaho, and work is under way on an extension of its road from Council to Stevens, 14.50 miles. Track has been laid from Council for a distance of about 4 miles. The company is also making surveys for an extension from Stevens to a point near Pollock, Idaho.

PAN-AMERICAN.—An officer writes that this company has given contracts to Lyons Bros. and Everett & Gordon, of Tonala, Chiapas, Mexico, for extending its road from Coapa to San Bonita, 125 miles, and is making surveys for an additional 31 miles from San Bonita to the Guatamala Boundary.

QUEBEC & LAKE ST. JOHN.—Work is under way on the extension of this road from a point 12 miles west of La Luque Junction, Quebec, to St. Maurice Keier, a distance of 28 miles. Joseph Paquet of La Tuque Junction is the contractor. The company has also projected a road from its northwest terminal at Roberval northwest to Chute a l'ours, an additional 30 miles.

ST. LOUIS, BROWNSVILLE & MEXICO.—This company, which recently completed its road north as far as Bay City, Tex., has given a contract to P. M. Johnston, of St. Elmo, Ill., for extending the line from that point north to Algoa, a distance of 59 miles.

SAN PEDRO, LOS ANGELES & SALT LAKE.—This company has given a contract to the Utah Construction Co., of Ogden, Utah, for building spurs near Topliff, Utah, aggregating 4½ miles in length, and chang-

ing the location of the old main line at Trent for a distance of about five miles.

Texas Southeastern.—This company, which recently completed its road from Diboll, Tex., west to the Naches river, a distance of nine miles, is building from the latter place northwest to Weches, a distance of 25 miles.

Tidewater.—MacArthur Bros. Co., of New York, who have been given the contract by this company to build about 120 miles of its road from Norfolk, Va., west, are asking for bids on 108 miles of the road from Roanoke west to West Virginia. The work will be heavy, much of it through solid rock, and there will be a number of short and long tunnels, and will take about two years to complete.

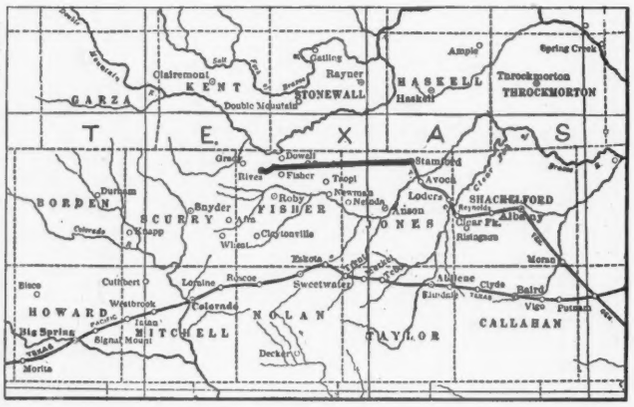
Topeka & Northwestern.—A contract has been let by this company to Kilpatrick Bros. & Collins, of Beatrice, Neb., for extending its line from Station No. 2, Kansas to Onaga, 17.37 miles. Work is already begun.

Trinity & Brazos Valley.—A contract has been given by this company to P. M. Johnson & Co., of Mexia, for extending its road from Mexia southeast to Houston, 157 miles, and from Brewer northwest to Waxahachie, a distance of 70 miles. (Sept. 8, p. 80.)

Western Allegheny.—A contract has been given by this company to F. A. Maselli & Co., of Pittsburg, for building an extension of its road from Rosepoint west toward Newcastle, a distance of 10.7 miles.

West Jersey & Seashore (Electric).—A contract has been given by this company to P. McManus, of Philadelphia, for the work incident to the electrification of its lines from Camden to Atlantic City.

Texas Central.—This company is planning to build an extension of its road from Stamford, Tex., west for a distance of 45 miles to



Texas Central.

Rives, in the northwest corner of Fisher County. Contracts have been let for the rails and ties. Over 90 per cent. of the line will be tangent.

Western Maryland.—An officer writes that this company, which is building west to Cumberland, Md., has surveys under way for building an additional 155 miles of road.

Wichita Valley.—A contract has been let by this company to J. P. Nelson, of Seymour, Tex., for extending its road from that place southwest to Stamford, 61 miles.

Yazoo & Mississippi Valley (Ill. Cent.).—A contract has been let by this company to the Hemingway Construction Company, of Jackson, Miss., for extending its line from Philipp, Miss., north for a distance of 15 miles.

Youngstown & Southern (Electric).—An officer writes that this company, which is planning to build its projected road from Columbiana, Ohio, west to Salem and south from Columbiana to East Liverpool, a total distance of 36 miles, has 16 miles of roadway under temporary operation by steam from Youngstown south to Columbiana. Surveys have been made and construction work will be started early next spring. The road when completed will be operated by electricity.

RAILROAD CORPORATION NEWS.

American Railways Company (Electric).—This company has acquired a controlling interest in the common and preferred stock of the Scranton (Pa.) Railway, having bought both classes at par ($50). The Scranton Railway operates 81 miles of road and has outstanding $2,000,000 common, $1,500,000 5 per cent. cumulative preferred stock and $3,000,000 bonds.

Boston Elevated.—The gross earnings for the year ended June 30 were $12,689,676, an increase of $298,323, and expenses were $8,617,653, a decrease of $13,900. The surplus available for dividends was $835,084, an increase of $5,313, and the net surplus was $37,084.

Canadian Pacific.—The gross earnings of this company during the month of November increased about $1,000,000, or 21 per cent., as compared with the same month last year. The increase in net was $691,431, or 41 per cent.

Central of Georgia.—It is reported that the company has bought, for $400,000, the Stillmore Air Line, which runs from Wadley, Ga., to Collins, 54 miles. It has $175,000 capital stock and $350,000 first mortgage 4 per cent. bonds of 1920 outstanding.

Chicago & Eastern Illinois.—The Supreme Court of the State of New York has decided in favor of the plaintiffs in the action begun by two bondholders of this company to annul the traffic agreement made on April 14, 1904, between the C. & E. I., the St. Louis & San Francisco and the St. Louis, Memphis & Southeastern. An agreement was entered into, in 1902, putting the properties of the Chicago & Eastern Illinois into the hands of a trustee in order to preserve these assets for the benefit of the stockholders, and trust certificates were then issued by the Colonial Trust Co. against the bonds of the railroad company. The second agreement, made in 1904, gave to the St. L. & S. F. nearly all of the traffic of the C. & E. I., and on the strength of this agreement an issue of $16,000,000 in bonds, secured by the properties of the St. Louis, Memphis & Southeastern, was announced. The court holds that this second agreement was a violation of trust, inasmuch as it imposed a new obligation on the C. & E. I., thereby violating the conditions of the first agreement.

Chicago Elevated Roads.—During 1905 the Northwestern Elevated carried 28,238,621 passengers, an increase of 9.89 per cent. as compared with the previous year. The South Side Elevated carried 32,959,752 passengers, an increase of 8.47 per cent. The Metropolitan Elevated carried 45,358,915 passengers, an increase of 8.8 per cent.

Cincinnati, Hamilton & Dayton.—The receiver has been given permission to borrow $900,000 to help pay the interest due January 1st on various C., H. & D.-Pere Marquette securities. No funds have been received by the American Loan & Trust Co., Boston, to meet the January coupons on the $3,500,000 C., H. & D.-Pere Marquette 4 per cent. collateral trust bonds secured on the Chicago, Cincinnati & Louisville stock. The interest on the $3,500,000 4½ per cent. first mortgage bonds of the Toledo Railway & Terminal Co., which were guaranteed by the C., H. & D. and Pere Marquette, has been defaulted and the company is therefore liable to sale under foreclosure. This would destroy the Pere Marquette's control of the property through ownership of a majority of the stock. No announcement has been made as to payment of the guaranteed dividends on Pere Marquette common and preferred stock. (Dec. 29, p. 208.)

Colorado Southern, New Orleans & Pacific.—The stockholders have adopted an amendment to the charter of this company, increasing the capital stock from $5,000,000 to $12,000,000.

Kansas City Southern.—The meeting of the stockholders called for Feb. 1st, to act on the question of authorizing $5,100,000 six-year 5 per cent. collateral notes, has been postponed.

Minneapolis, St. Paul & Sault Ste. Marie.—The estimated gross earnings for November were $1,060,000, an increase of 16 per cent. over the figure for the corresponding period of the previous year. The increase for five months was 32 per cent., and the surplus for ten months increased 106 per cent.

New York, New Haven & Hartford.—The directors have decided to allow the holders of the $185,300 outstanding 4 per cent. convertible debenture bonds of 1908 to exchange them for stock, par for par. The privilege of conversion of these bonds originally expired on April 1, 1908, at which time about $16,000,000 had been exchanged.

Pennsylvania.—The preferred stock of the Allegheny Valley will be exchanged at the office of the Union Trust Co., Pittsburg, on or after April 2, 1906, for Pennsylvania stock at the rate of 1⅛ shares of the last named securities for two shares of Allegheny Valley. (November 17, p. 160.)

Pere Marquette.—See Cincinnati, Hamilton & Dayton.

Southern.—The Transylvania is now operated under lease by the Southern as part of its Asheville division. (Dec. 29, p. 208.)

Stillmore Air Line.—See Central of Georgia.

Toledo Railway & Terminal.—See Cincinnati, Hamilton & Dayton.